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Population Reports

Oral Contraceptives

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OCs—Update on Usage, Safety, and Side Effects

Summary. After nearly two decades of use, oral contraceptives (OCs) are the most popular reversible method of contraception in the world today. According to marketing statistics gathered from at least 31 countries, about 325 million cycles of oral contraceptives were sold in 1977. This quantity would supply 25 million women for one year, of whom about 21 million are in developed countries and 4 million in developing countries. Although sales are leveling off or declining somewhat in Western Europe and the United States, where use rates now range up to 40 percent of women aged 15–44, sales are increasing rapidly in Asia and Latin America.

At the same time, national family planning programs in developing countries provide oral contraceptives on a free or subsidized basis to about 9 million women (excluding the People's Republic of China). The United States Agency for International Development (USAiD) delivered close to 100 million cycles annually to these countries over the last five years. Other governments and United Nations agencies also provide supplies for national programs. It is estimated that, including 10–15 million users in the People's Republic of China, about 54 million women throughout the world were using oral contraceptives in 1977, an increase of 4 million over the estimate published in **Population Reports** in 1974.

Circulatory System Disease

With respect to the safety of oral contraceptives, data from three major cohort studies in Britain and the United States throw new light on the relationships between OC use and circulatory system disease. A study of 46,000 British women by the Royal College of General Practitioners found that:

- OC users experienced higher death rates from circulatory system disease—25.8 per 100,000 woman-years of observation—than did women who had never used orals—5.5 per 100,000 woman-years. These rates are averages including women with conditions conducive to circulatory system disease as well as women with no such conditions.

- OC users faced a greater range of circulatory system diseases than was originally suspected, including arterial as well as venous disorders. In addition to myocardial infarction, pulmonary embolism, and cerebral hemorrhage, women in this study experienced subarachnoid hemorrhage, malignant hypertension, cardiomyopathy, and mesenteric-artery thrombosis.

- Women who used OCs for five years or more faced a tenfold greater risk of death from circulatory disease than women who never used the pill. Even after discontinuing, women who had used the pill faced slightly higher risks, especially of subarachnoid hemorrhage.

- Most important for individuals and for family planning programs, these risks do not apply to all women equally. Women over 35 and women who smoke face by far the greatest hazards. Death rates for OC users aged 35–44 were 42.6 per 100,000 woman-years and for OC users who smoke, 39.5 per 100,000 woman-years, compared with less than 9 for OC users under 35 and about 14 for OC users who do not smoke.

These findings from the Royal College study are generally confirmed by other published British data from the Oxford/Family Planning Association study and by data now becoming available from the United States study in Walnut Creek, California. All three studies highlight the previously suspected but not proved effect of smoking, which may not merely add to but in some diseases multiply the risk associated with OC use. It is also becoming clear that other factors predisposing to the development of circulatory disease—hypertension, high cholesterol levels, diabetes,

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and obesity—play important roles in mortality among OC users.

A key question not answered by any of the studies is the extent of risk for women under 35 who do not smoke and who have no other conditions predisposing them to develop circulatory system disease. Despite the fact that, in the largest study, 46,000 women had a cumulative experience of some 200,000 woman-years, there were so few deaths among the younger, nonsmoking women (one, at age 32) that it is not possible to determine at acceptable levels of statistical significance what residual risk of oral contraceptive use remains for these women. Although an increased risk probably exists, it is very small.

To complicate the issue further, analysis of circulatory system disease death rates in countries where OC use is high does not show the changes that would be expected if the use of OCs in fact produced a fivefold increase in deaths among all users. For example, in the United States, England and Wales, and Denmark, the trend of all circulatory disease death rates has been downward, with the exception of diseases of the veins, for women of all ages, even in the face of increases in OC use.

Further, in a 21-country analysis, WHO researchers found that improving death rate trends for women aged 35–44 were associated with trends of increasing OC usage. While national mortality data by their very nature cannot provide conclusive evidence of slight risks in oral contraceptive use, analyses of these trends do reinforce the other indications that any increased risk from OC use is relatively small and is largely, if not entirely, limited to specific subgroups of women—those over 35, those who smoke, and those with other conditions predisposing them to circulatory system disease.

With regard to cancer, no definitive new data are available, but this in itself is reassuring. The fact that cancers have long latent periods has been used to argue against reaching any conclusion prematurely. With oral contraceptive use now in its second decade, that argument is losing some of its force.

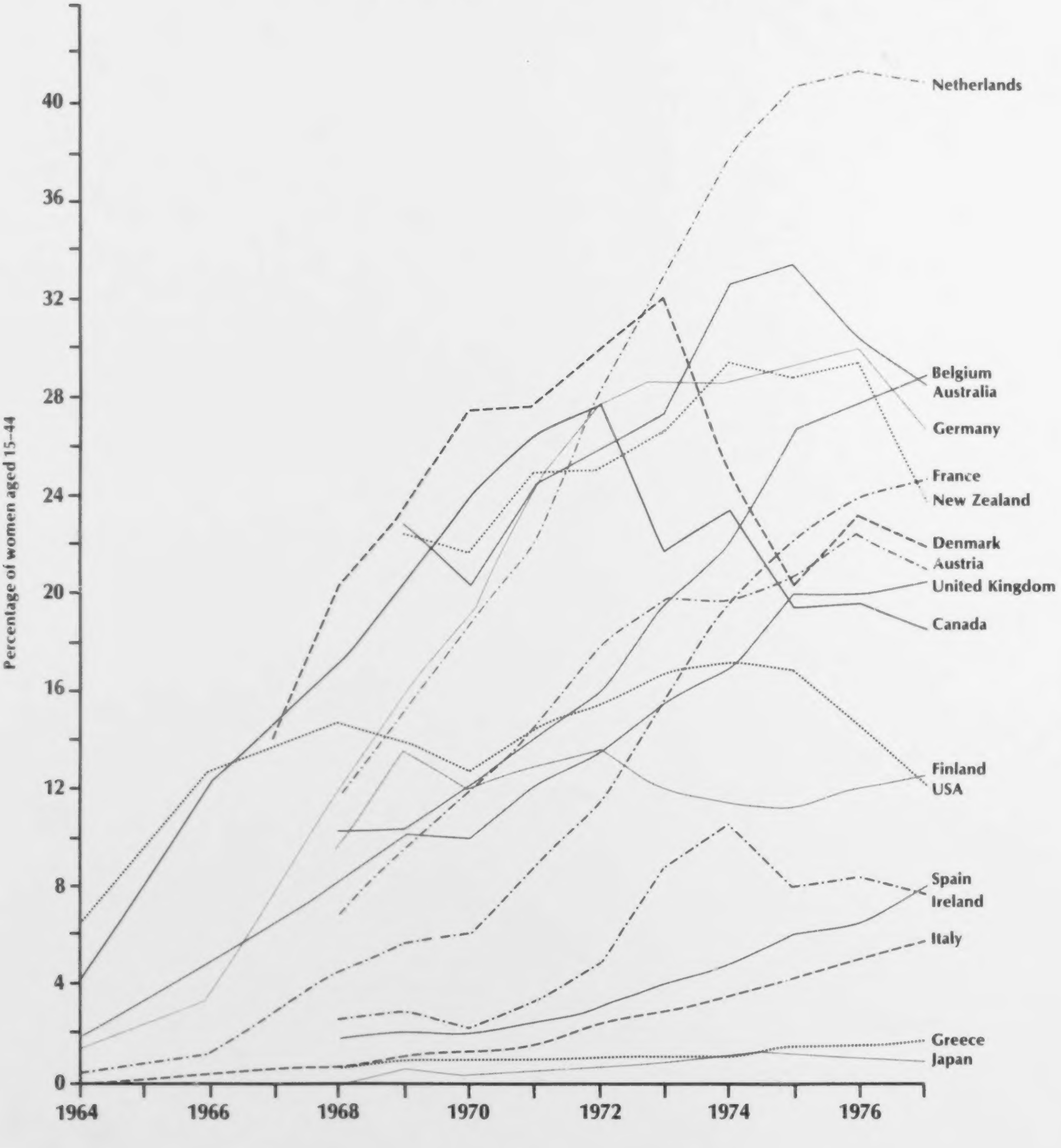
Investigations of other possible side effects have revealed no substantial new risks associated with OC use, and, in fact, some fears—particularly over adverse effects on subsequent fertility and on offspring conceived after pill use—have been eased by recent reports. Unsuspected benefits—a possible protective effect against ovarian cancer and an apparent reduction in rheumatoid arthritis—have been noted.

Virtually all the data on serious side effects of oral contraceptives come from developed countries, where circulatory disease and the factors predisposing women to it are common, perhaps affecting as much as one-third of the female population of reproductive age. In these countries, the continuing usage and popularity of oral contraceptives underline the need to identify and inform those women who face special risks so that they can make knowledgeable choices of their method of family planning and, in the interests of their long-term health, stop smoking and possibly modify their diet and lifestyles. For older couples or those whose families are complete, voluntary sterilization provides an acceptably safe and increasingly popular alternative.

What are the implications of these findings for developing countries? First, it should be emphasized that US and British findings cannot automatically be applied to women in developing country settings. In the developing world, circulatory system disease is rare, cholesterol levels are low, and few women smoke, so it may well be that OC use poses no serious threat of circulatory disease in most developing countries. Second, there is increasing need, as OC use in these areas expands, to determine what the various hazards may be in developing countries and which women face the greatest risk. Should an increased risk be demonstrated, it might then be relatively easy, by self-screening or program check lists at the village level, to encourage sterilization or use of other methods by high-risk women.

Overall, the risks of using any contraceptive method are far outweighed in the developing countries by the much greater risks of pregnancy and childbirth. In Bangladesh, for instance, where use of contraceptives is negligible, almost 200 women per 100,000 in each 5-year age group can be expected to die in childbirth. This should be compared with about 10 to 20 deaths per 100,000 associated with the use of orals by Bangladeshi women under age 40. Even in developing countries where maternal mortality is lower than in Bangladesh, OCs are much safer than childbirth at all ages below 40. Under these circumstances, the continued increase in OC use in the developing world and the

Figure 1. Minimum Percentage of Women Aged 15-44 Supplied with Oral Contraceptives through Commercial Channels in 17 Developed Countries, 1964-1977



Source: IMS International/America, Ltd., studies prepared for the Population Information Program, 1977 and 1978 (81, 82); Gram (67) (Denmark only) spread of community-based distribution systems (described in **Population Reports** J-19) are well justified from a public health point of view, contributing as they do not only to lower birth rates but also to improved maternal health and survival.

COMMERCIAL SALES

Combined oral contraceptives—consisting of an estrogen and a progestin component—were first marketed in June 1960 in the United States. Within five years, purchases of OCs for prescription sales by US pharmacies had reached 65 million cycles. In other developed countries sales of oral contraceptives began somewhat later but increased with comparable or greater rapidity. Today these sales constitute the major source of oral contraceptive supplies for women in developed countries and an increasingly important source of supply in developing countries (see **Population Reports** A-1, April 1974).

Purchases of oral contraceptives (and other prescription drugs) by pharmacies are audited regularly by IMS, Ltd. Data are compiled from invoices gathered from a sample of pharmacies or, in a few cases, from wholesalers and prescribing physicians in major pharmaceutical marketing areas. The sample ranges from about one percent to 10 percent of the total number of pharmacies in each country. The pharmacies sampled are chosen as representative of the range of shop size, based on total store sales volume, within each region. Purchases by hospitals and family planning clinics, donations, and free samples are excluded, as are purchases by other outlets. The latter may account for a portion of sales in countries where a prescription is not required by law. All pharmacy purchases are included, whether or not customers are required to have prescriptions.

Total pharmacy purchases of oral contraceptives in these major market areas in the developed and developing countries amounted in 1977 to nearly 325 million cycles, representing some 25 million woman-years of contraception. This is an increase of about 5 million users since 1972 (see **Population Reports** A-1, April 1974). Generally, commercial sales in Western Europe and the English-speaking world reached a peak in 1975 and declined somewhat in 1976 and 1977, with the biggest declines occurring in the United States during 1976 and 1977 and in the Federal Republic of Germany during 1977 (see Table 1).

In the developing countries, sales continue to grow, especially in Brazil, where more than 2 million women are now buying oral contraceptives (see Table 1). Commercial sales of OCs in the developing world account for only about 56 million cycles, less than one-fifth as many as in developed countries. Since 1970, however, sales have increased by an average of nearly 6 million cycles annually, with the greatest increase between 1972 and 1973. Asian sales have tripled since 1972 and in Latin America, starting from a larger base, they have more than doubled. Nevertheless, even in Brazil and Puerto Rico, where usage is highest, fewer than 10 percent of the women of reproductive age are purchasing oral contraceptives regularly (see Table 2).

In the developed countries, despite declining sales in the last two years, oral contraceptives are still widely sold to women who can afford prices ranging upward from $1.50 (US) per month. In 12 of the 18 developed countries for which IMS has current data—Australia, Austria, Belgium, Canada, Finland, Federal Republic of Germany, France, the Netherlands, New Zealand, Portugal, the United States, and the United Kingdom—more than 10 percent of all women aged 15-44 are buying orals (see Figure 1). In the United States enough oral contraceptives were sold to pharmacies in 1977 to provide 12.2 percent of all women aged 15-44 with a full year's supply. The Netherlands has the highest proportion of OC users, over 40 percent.

Other data, some from the National Survey of Family Growth, confirm relatively high rates of oral contraceptive use in the United States. In 1976, 22.3 percent of married women of reproductive age (MWRA) were using oral contraceptives, down slightly from 25.1 percent, recorded in 1973 (60). While orals are still the choice of younger women and women who intend to have more children, sterilization is increasingly chosen by older couples. By 1976, 28.3 percent of couples where the wives were aged 15-44 reported husband or wife sterilized, 19.3 percent for contraceptive reasons. Among couples where the wives were aged 30-44, 28.4 had chosen sterilization for contraceptive reasons, with an equal proportion of husbands and wives sterilized. Thus the popularity of voluntary sterilization now rivals that of oral contraceptives (221).

In organized US family planning programs, which serve about 3 million women, the proportion of clients using pills is very high, 67.2 percent, while that choosing sterilization is quite low, probably reflecting referrals of sterilization clients to other services. The percentage of these clinic-served women using orals has fallen slightly from 70.3 percent in 1970 (200).

The trend in the United States toward selection of formulations with lower estrogen content is continuing, according to IMS data (see Table 3). Combination oral contraceptives with 50 μg of estrogen—which constituted less than 10 percent of the market in 1967—increased their share to more than 50 percent by 1977. Moreover, since 1972 formulations with even less than 50 μg of estrogen have been approved, and they now account for nearly 18 percent of the market. OCs with 100 or more μg of estrogen constitute less than 20 percent of prescription sales, but the 100 μg and 80 μg formulations, while falling from 43.6 percent of the market in 1973, are still the choice of one-quarter of US pill users. The continued use of these formulations may be explained by some women's need for more estrogen to prevent breakthrough bleeding or by preferences for familiar and satisfactory brands.

Oral contraceptive use is high in a number of developed countries not included in the IMS audit. For example, in Denmark in 1976, 1977, and the first half of 1978, there were approximately 240,000 women using oral contraceptives, or 23 percent of women aged 15-44 (7); in Sweden an average of about 6 million cycles was sold in 1976 and 1977 (48), representing about 460,000 women or 28 percent of women aged 15-44; and in Hungary an estimated 500,000 women were using orals in 1976, or about 20 percent of all women aged 17-49 (101, 102).

Table 1. Retail Pharmacy Purchases of Oral Contraceptives in Selected Areas, by Country and Year, 1970–1977

(in thousands of cycles)

	1970	1971	1972	1973	1974	1975	1976	1977
DEVELOPED AREAS								
Australia	6,815.7	8,191.3	8,976.5	9,813.8	11,983.2	12,561.4	11,667.8	11,056.7
Austria	2,174.1	2,671.2	3,332.0	3,743.3	3,738.1	3,956.2	4,316.8	4,130.3
Belgium	2,996.0	3,464.6	3,909.8	4,957.5	5,563.9	6,796.5	7,141.0	7,471.0
Canada	14,012.0	15,889.0	17,117.0	13,884.5	15,315.0	12,952.1	13,413.5	13,024.0
Finland	1,610.7	1,782.2	1,865.9	1,589.0	1,527.9	1,507.0	1,629.9	1,703.9
France	8,231.0	11,833.9	15,299.0	21,495.9	27,221.1	31,133.9	33,796.4	35,088.7
Germany, Fed. Rep.	29,369.9	37,879.1	42,901.1	45,746.0	45,833.5	47,178.6	48,950.0	44,220.2
Greece	226.9	277.1	286.9	271.0	266.9	364.0	367.8	383.3
Ireland*	151.5	228.8	334.4	657.8	805.6	623.5	671.6	637.1
Italy	1,808.8	2,231.2	3,677.4	4,268.2	5,334.2	6,431.1	7,625.6	8,438.6
Japan*	1,042.6	1,368.2	1,911.9	2,804.4	4,450.2	4,135.7	3,708.7	3,180.3
Netherlands	6,518.0	7,760.0	10,149.6	11,998.5	13,959.9	15,204.6	15,693.9	15,749.2
New Zealand	1,593.6	1,896.6	1,949.8	2,082.3	2,381.6	2,354.5	2,460.9	2,052.5
Portugal						3,040.9	3,752.0	3,981.0
South Africa						2,414.0	2,246.6	2,026.5
Spain	1,823.4	2,285.0	2,760.0	3,753.8	4,447.4	5,756.8	6,146.8	7,539.3
United Kingdom	13,824.7	16,997.9	18,948.2	21,790.5	23,812.5	28,163.6	28,494.2	29,492.9
United States	70,655.3	81,203.7	89,147.2	98,327.0	102,761.0	102,790.0	90,690.0	77,589.0**
Subtotal	162,854.2	195,959.8	222,566.7	247,183.5	269,402.0	287,364.4	282,773.5	267,764.5
DEVELOPING AREAS								
Asia								
Indonesia						792.3	931.2	1,028.1
Iran			596.8	615.5	639.5	866.1	1,199.0	1,529.4
Pakistan						166.8	216.9	218.6
Philippines	982.9	755.2	623.0	745.6	798.2	697.7	697.9	740.0
Saudi Arabia						560.9	328.4	473.2
Turkey	932.1	1,349.5	1,484.4	1,958.1	1,876.5	2,461.4	3,038.5	4,144.1
Subtotal	1,915.0	2,104.7	2,704.2	3,319.2	3,314.2	5,545.2	6,411.9	8,133.4
Latin America								
Argentina	3,406.0	3,514.3	3,924.3	4,306.4	4,297.7	3,209.1	3,863.4	3,388.2
Brazil	6,895.0	9,314.3	10,383.2	17,966.3	22,490.8	26,207.4	24,320.6	28,577.8
Central America			1,012.8	1,112.8	1,103.1	1,097.7	1,249.1	1,192.8
Colombia	1,105.0	1,404.2	1,641.5	2,048.3	2,417.2	2,794.3	3,064.1	3,328.3
Ecuador						470.1	532.8	533.6
Mexico	2,810.0	2,715.8	3,628.4	5,244.6	5,974.4	6,176.8	6,373.5	7,244.3
Peru	376.0	497.6	680.3	867.0	1,203.6	986.0	1,171.1	1,218.5
Puerto Rico	233.0	311.0	427.0	449.9	809.0	840.3	715.2	885.8
Venezuela	553.0	716.1	828.4	1,203.7	1,361.9	1,512.7	1,764.1	2,000.3
Subtotal	15,378.0	18,473.3	22,525.9	33,199.0	39,657.7	43,294.4	43,053.9	48,369.6
TOTAL	180,147.2	216,537.8	247,796.8	283,701.7	312,373.9	336,204.0	332,239.3	324,267.5

*Products licensed for therapeutic, not contraceptive purposes

**In the 12 months ending June 1978, 71,895

Note: These figures do not include subsidized programs, samples, or sales to hospitals or family planning clinics.

Source: IMS International/America, Ltd., studies prepared for the Population Information Program, 1977 and 1978 (81, 82)

Table 2. Minimum Percentage of Women Aged 15-44 Supplied with Oral Contraceptives through Commercial Channels in Selected Areas, 1970-1977

	1970	1971	1972	1973	1974	1975	1976	1977
DEVELOPED AREAS								
Australia	20.2	24.2	25.6	27.2	32.5	33.4	30.3	28.0
Austria	11.8	14.4	17.9	19.8	19.6	20.7	22.3	21.0
Belgium	12.1	14.0	15.6	19.5	21.8	26.5	27.6	28.7
Canada	23.9	26.4	27.7	21.7	23.4	19.4	19.6	18.7
Denmark*	27.5	27.6	29.9	32.1	24.9	20.3	23.2	22.2
Finland	11.9	13.1	13.6	11.9	11.4	11.2	12.0	12.5
France	6.1	8.8	11.3	15.6	19.6	22.2	23.9	24.6
Germany, Fed. Rep.	18.9	24.4	27.6	28.7	28.6	29.3	30.0	26.8
Greece	0.9	1.0	1.1	1.1	1.1	1.5	1.5	1.6
Ireland	2.2	3.2	4.8	8.7	10.5	7.9	8.3	7.7
Italy	1.2	1.5	2.4	2.9	3.6	4.3	5.1	5.6
Japan	0.3	0.4	0.6	0.8	1.3	1.2	1.1	0.9
Netherlands	18.6	21.8	28.1	32.8	37.7	40.5	41.2	40.8
New Zealand	21.5	24.9	25.0	26.6	29.7	28.7	29.3	23.9
Portugal					0.7	12.3	15.0	15.8
South Africa						3.4	3.1	2.7
Spain	1.9	2.4	3.0	4.0	4.7	6.1	6.4	7.8
United Kingdom	9.9	12.1	13.4	15.5	16.9	19.8	19.8	20.3
United States	12.7	14.4	15.4	16.7	17.1	16.8	14.5	12.2
DEVELOPING AREAS								
Asia								
Indonesia						0.2	0.2	0.2
Iran			0.8	0.8	0.8	1.0	1.3	1.6
Pakistan							0.1	0.1
Philippines	1.0	1.3	0.6	0.7	0.7	0.6	0.6	0.6
Saudi Arabia						0.3	1.3	1.9
Turkey	1.0	1.4	1.5	1.9	1.8	2.3	2.8	3.7
Latin America								
Argentina	4.9	5.0	5.6	6.2	6.1	4.5	5.4	4.7
Brazil	2.7	3.5	3.8	6.2	7.5	8.5	7.7	8.7
Colombia	1.9	2.4	2.7	3.2	3.6	4.0	4.2	4.4
Ecuador						2.5	2.7	2.6
Mexico	2.1	2.0	2.5	3.6	4.0	4.0	3.9	4.3
Peru	1.0	1.3	1.8	2.2	3.0	2.3	2.7	2.7
Puerto Rico	2.9	3.7	5.0	5.4	9.5	9.6	8.0	9.3
Venezuela	2.0	2.6	2.9	3.9	4.3	4.6	5.1	5.6

Note: These percentages were calculated from the data in Table 2 as follows:

1) Pharmacy sales of oral contraceptives were divided by 13 to give the maximum number of women taking oral contraceptives for one full year or woman-years of use.
2) Woman-years were divided by the female population aged 15–44 × 100 to give the minimum percentage of women aged 15–44 buying oral contraceptives in sufficient quantity for one year of use.

These figures represent the minimum number of users because the woman-years concept counts, for example, two women using orals for 6 months apiece as one woman-year. On the other hand, pharmacy purchases from wholesalers include supplies in inventory and thus may overcount actual users during a period of inventory build-up. No attempt is made in these data to account for nonfertile women or women not married, not at risk of pregnancy, or already pregnant.

Source: IMS International/America, Ltd., studies prepared for the Population Information Program, 1977 and 1978 (81, 82)

*Anderson (7), Gram (67)

FAMILY PLANNING PROGRAM DISTRIBUTION

Unlike the developed countries, where commercial sales account for most of the contraceptives used, in the developing countries organized family planning programs play the major role in supplying women with oral contraceptives. Since 1967 the US Agency for International Development (USAID) has been the most important source of supply for developing country programs, in both the public and private sectors (see Table 4 and Figure 2). USAID supplies have increased from less than 4 million cycles in 1968 to close to an estimated 105 million in 1978. Since 1974, when USAID shipments more than doubled, from 40 million to 103 million, yearly deliveries to some 65 countries have averaged about 97 million cycles. Countries now receiving the largest quantities are Morocco, Bangladesh, Indonesia, the Philippines, and Thailand. USAID pays about $.18 (US) a cycle, including shipping. Supplies also go to private voluntary agencies like the International Planned Parenthood Federation for use in their programs.

Another government that has made oral contraceptives available to developing countries is Sweden. Through its International Development Authority (SIDA), Sweden provided or acted as a purchasing agent for some 40 million cycles between 1967 and 1973 (see **Population Reports** A-1, p. A20) and another 13 million during 1974–1977. Swedish donations in 1977 amounted to about 4 million cycles for Kenya, Sri Lanka and Viet-Nam. In 1978 SIDA plans to ship 50,000 cycles to Sri Lanka only (see Table 5). The United Nations Fund for Population Activities (UNFPA) will continue to provide contraceptives to most of the other countries.

As a source of support for national government population programs, including provision of contraceptive supplies, UNFPA is playing an increasing role. UNFPA funding for all contraceptive supplies totalled approximately $13 million between 1969 and 1976, with $3.4 million expended in 1977 and $5.3 million budgeted in 1978. Oral contraceptives may represent roughly 60 percent of these figures at an average cost per cycle, including shipping, of $.25 (US). UNFPA has provided raw materials for the manufacture of oral contraceptives to Egypt, India, and Cuba. Within the UN system about 80 percent of the contraceptives funded by UNFPA are purchased and delivered by the UN Children's Fund (UNICEF) and 20 percent by the World Health Organization (WHO). According to USAID data on oral contraceptive deliveries received during 1977, some 2 million cycles from UN agencies reached Bangladesh; 1.3 million, Thailand; 1 million, Costa Rica; 708,000, Colombia; and smaller amounts, Tunisia, El Salvador, the Dominican Republic, Haiti, and Paraguay.

Other donors who provide quantities of oral contraceptives—often brands or formulations which USAID does not provide—include the International Planned Parenthood Federation, the Pathfinder Fund, Family Planning International Assistance, and other governments. The total supply now provided as development assistance is probably in the neighborhood of 120 million cycles, or about double the amount sold through commercial channels in developing countries.

Table 3. Oral Contraceptives Sold in the United States, by Progestin and Estrogen Content, 1963–1978

Content (in mg)	Dollar Sales Volume as Percent of Market								
	1963	1967	1972	1973	1974	1975	1976	1977	1978*
Progestins									
Combination									
10.0	21.2	3.5	2.0	0.4	0.4	0.4	0.3	0.3	0.2
5.0	78.8	4.5		1.1	0.8	0.6	0.4	0.4	0.3
2.5	0.0	12.0	14.0	5.9	5.4	4.8	4.2	3.8	3.3
2.0	0.0	28.0		7.2	5.8	4.5	4.2	3.8	2.8
1.5				0.1	0.8	1.3	2.0	2.3	2.4
1.0–1.5	0.0	30.0	77.0						
1.0				54.7	56.2	56.4	57.3	57.9	57.4
0.5				23.4	24.3	24.9	22.7	21.5	22.3
0.4				0.0	0.0	0.0	0.2	0.2	0.3
0.35				0.3	0.2	0.2	0.2	0.1	0.1
0.3				0.0	0.0	1.5	6.9	9.5	10.7
0.075				0.0	0.2	0.1	0.0	1.0	1.0
Sequentials (all)	0.0	22.0	7.[illegible]	6.8	5.8	5.4	1.6	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Estrogens									
> 0.100	13.9	17.7	9.2	0.3	0.2	0.2	0.1	0.2	0.1
0.100	2.3	56.0	21.8	27.4	25.3	23.2	19.1	16.6	14.1
0.080	0.0	5.8	15.5	16.2	16.8	16.4	14.9	13.2	12.5
0.075	74.6	10.1	1.8	1.1	0.8	0.6	0.4	0.4	0.3
0.060	9.2	0.7	0.4	0.2	0.2	0.2	0.1	0.1	0.1
0.050	0.0	9.7	51.3	53.1	54.4	53.9	53.4	53.6	54.5
0.035				0.0	0.0	1.3	1.5	2.9	4.2
0.030				0.1	0.8	2.8	8.9	11.8	13.1
0.020				1.3	1.1	1.1	1.3	1.0	0.9
0**				0.3	0.4	0.3	0.2	0.2	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*12 months ending June 1978
**Progestin-only minipill

Source: IMS America, Ltd., study conducted for the Population Information Program, 1977 and 1978 (81)

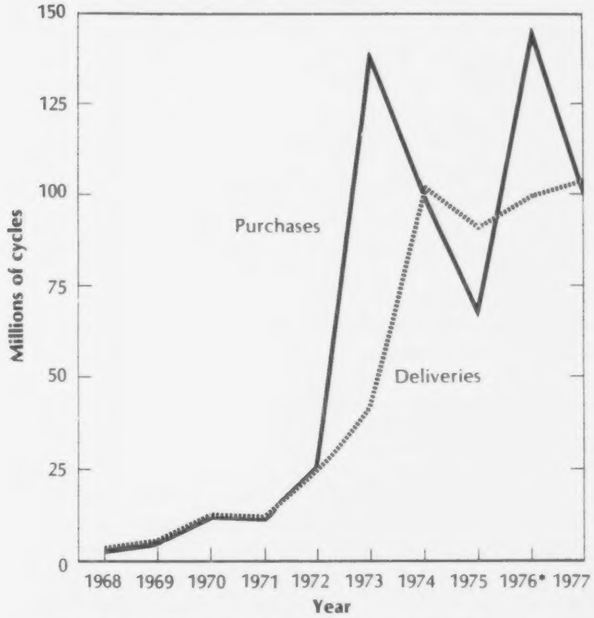
Table 4. Deliveries of Oral Contraceptives (in thousands of cycles) Financed by the United States Agency for International Development by Calendar Year and Area, 1967–1978

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	Est. 1978	Total
AFRICA													
Botswana	—	—	—	—	—	100	—	50	25	—	2	22	199
Ethiopia	—	—	29	—	5	—	30	—	313	—	—	—	377
Ghana	—	40	83	87	407	79	324	1,235	1,090	1,749	—	90	5,184
Kenya	—	103	215	20	49	81	179	253	100	—	—	—	1,000
Lesotho	—	—	—	—	—	—	16	50	6	20	—	—	92
Liberia	—	—	—	—	30	30	60	2	—	107	—	20	249
Mauritius	—	—	—	—	50	—	—	5	5	—	—	—	60
Morocco	—	—	30	40	160	200	987	2,300	703	700	5,011	5,000	15,131
Nigeria	—	—	85	15	120	50	167	25	160	—	6	—	628
Sierra Leone	—	—	10	—	10	5	2	61	3	15	—	22	128
Sudan	—	—	—	—	—	—	—	14	85	—	102	20	221
Swaziland	—	—	—	—	—	—	—	158	—	—	—	—	158
Seychelles	—	—	—	—	—	—	3	62	8	—	—	—	73
Tanzania	—	—	50	—	40	55	80	52	315	485	1,801	1,844	4,722
Tunisia	—	180	92	64	12	220	72	271	160	930	670	720	3,391
Uganda	—	—	—	10	20	5	—	50	16	150	—	30	281
Zaire	—	—	—	—	—	—	27	142	25	20	150	—	364
Zambia	—	—	—	—	—	—	5	50	226	20	—	—	301
Other (6)*	—	22	19	—	34	25	10	24	10	5	—	41	190
Subtotal	—	345	613	236	937	850	1,962	4,804	3,250	4,201	7,742	7,809	32,749
ASIA													
Afghanistan	—	60	40	100	170	—	—	240	400	27	—	200	1,237
Bangladesh	—	—	—	—	—	175	20	9,087	7,540	8,655	10,570	18,503	54,550
Egypt	—	—	—	—	—	—	—	1,200	—	—	—	—	1,200
Hong Kong	—	15	220	—	300	250	150	50	—	—	—	—	985
India	30	970	470	—	—	—	—	—	—	—	—	—	1,470
Indonesia	—	261	90	1,100	2,100	5,640	15,636	18,807	29,188	30,800	59,160	36,216	198,998
Iran	—	—	—	—	—	—	—	103	—	10	—	50	163
Jordan	—	—	—	—	—	60	—	—	—	—	—	—	60
Korea, South	—	—	—	—	—	—	—	3,000	2,300	—	—	—	5,300
Laos	—	—	3	—	4	20	350	434	—	—	—	—	811
Malaysia	—	—	300	193	340	395	390	523	205	65	80	—	2,491
Nepal	—	155	100	100	5	44	446	906	575	3,300	—	—	5,631
Pakistan	—	26	—	400	350	395	40	4,676	10,123	12,568	—	—	28,578
Philippines	—	165	375	1,900	1,867	6,012	6,148	26,773	11,780	500	1,435	10,601	67,556
Singapore	—	436	—	—	—	—	—	—	—	—	—	—	436
Sri Lanka	—	37	30	35	50	100	25	184	50	—	—	—	511
Taiwan	—	50	220	580	500	1,942	935	1,620	—	135	—	—	5,982
Thailand	—	500	50	4,600	2,320	3,130	7,150	8,618	8,454	16,691	2,500	4,411	58,424
Vietnam	—	89	128	—	78	435	70	1,475	176	—	—	—	2,451
Other(7)*	—	6	—	—	—	1	—	144	3	28	30	31	243
Subtotal	30	2,770	2,026	9,008	8,084	18,599	31,360	77,840	70,794	72,779	73,775	70,012	437,077
LATIN AMERICA													
Barbados	—	17	36	60	200	—	70	74	—	—	—	—	457
Chile	—	—	80	800	—	500	389	1,863	1,360	600	816	—	6,408
Colombia	—	—	50	120	80	322	1,347	1,855	2,278	1,550	—	—	7,602
Costa Rica	—	35	—	225	150	159	322	335	800	400	—	504	2,930
Domin. Rep.	90	100	106	—	200	226	—	200	5	50	—	75	1,052
Ecuador	—	15	40	59	48	394	25	—	41	—	—	—	622
El Salvador	—	50	90	251	385	120	100	652	150	1,701	1,015	1,401	5,915
Mexico	—	—	—	—	—	—	—	—	—	—	—	10,502	10,502
Guatemala	—	110	100	120	250	200	349	415	600	380	—	—	2,524
Haiti	—	—	—	—	—	—	—	—	—	—	—	1,333	1,333
Honduras	—	15	75	77	169	310	84	461	640	1,295	—	356	3,482
Jamaica	—	195	196	105	5	41	183	701	400	524	550	397	3,297
Nicaragua	—	50	—	—	123	90	110	612	320	160	1,337	1,000	3,802
Panama	—	5	—	105	—	52	344	670	115	—	600	—	1,891
Paraguay	—	7	—	4	25	89	152	309	335	205	581	461	2,168
Peru	—	—	—	—	—	—	—	—	—	—	—	208	208
Uruguay	—	—	—	40	—	5	—	10	24	20	50	50	199
Venezuela	—	10	40	160	390	300	1,020	1,268	1,930	950	—	413	6,481
Other (17)*	—	14	61	101	148	64	159	143	323	44	2	25	1,084
Subtotal	90	623	874	2,227	2,173	2,872	4,654	9,568	9,321	7,879	4,951	16,725	61,957
Country NA	—	152	896	800	48	689	2,889	10,938	5,327	14,941	5,947	10,537	53,164
TOTAL	120	3,890	4,409	12,271	11,242	23,010	40,865	103,150	88,692	99,800	92,415	105,083	584,947

*Other—Designates countries with less than 50,000 cycles in any year, i.e., **Africa**: Burundi, Benin, Gambia, Rwanda, Senegal, Togo; **Asia**: Ryukyu Islands, Tonga, Khmer Rep., Lebanon, Iraq, Syrian Arab Rep., Cyprus; **Latin America**: Argentina, Antigua, Aruba, Bolivia, Dominica, Grenada, Guyana, Mauritius, Montserrat, Netherlands Antilles, Peru, St. Kitts, St. Lucia, St. Vincent, Surinam, Trinidad, Windward Islands.

Source: USAID, Office of Population (203, 204)

Figure 2. Purchases and Deliveries of Oral Contraceptives Financed by the United States Agency for International Development, by Fiscal Year for Purchases and by Calendar Year for Deliveries, 1968–1977



*Fiscal year 1976 includes July through September 1976.

Source: USAID, Office of Population (203, 204)

ESTIMATING USAGE

Counting, calculating, or estimating oral contraceptive usage in developing countries is difficult by any method. Although family planning program statistics are improving in most countries, they do not include commercial usage, and they often do not include programs sponsored by nongovernmental agencies. Table 6 presents and compares data on 1977 usage gathered by the Population Council and by USAID. In most cases, the Population Council figures are for January 1977, the USAID figures for October–November–December 1977. In countries with rapidly advancing programs, a year's time may make some difference, but other discrepancies between the estimates remain—in service program tallies, in commercial sales estimates, and even in the estimated numbers of married women of reproductive age that are used to calculate use rates.

Nonetheless, it is clear that in Africa only four countries report OC usage rates near or above 5 percent of married women of reproductive age: Egypt, reporting about 10 percent; Mauritius, with a high rate among developing countries of 29.2 percent; and Morocco and Tunisia, each with about 5 percent.

In Asia, at least nine countries appear to have usage rates higher than 5 percent: Hong Kong with 28 percent; Iran, reporting 21 percent, and Malaysia, reporting 27 percent (both figures that may be questionable); Singapore, Indonesia, and Thailand, between 12 and 17 percent; and Fiji, the Philippines, and Taiwan, between 5 and 10 percent.

In the Western Hemisphere also, at least nine developing countries may now have more than 5 percent of married women of reproductive age using orals: Costa Rica and Jamaica, both well over 20 percent; Colombia, the Dominican Republic, Nicaragua, Panama, and Paraguay, around 15 percent; and El Salvador and Mexico, between 5 and 10 percent.

Family planning service statistics such as these often reflect hopes as well as performance. Alternate sources of countrywide data now available are the various World Fertility Surveys, in which a representative sample of women of reproductive age is asked extensive questions on socioeconomic, demographic, fertility, and contraceptive status. Data from 11 countries have been released (see Table 7). These confirm oral contraceptive prevalence rates of more than 10 percent in Malaysia, Thailand, Colombia, Costa Rica, and Panama. Only Costa Rica is over 20 percent. These surveys were taken in 1974, 1975, and 1976, however, and some increases in usage would be likely in the years since.

Most of the developing countries which show high acceptance of oral contraceptives are those in which community-based or commercial distribution programs have been established. OCs are distributed in these countries by paramedical personnel, for example, midwives (as in Thailand and Malaysia), by community workers and village leaders (as in Colombia and Indonesia), or at subsidized rates through pharmacies or local shops and bazaars (as in Tunisia, Colombia, and Sri Lanka). In countries where physicians are in general scarce and in rural areas almost impossible to find, oral contraceptive use cannot be expanded except through nonmedical, nonclinical distribution systems (see **Population Reports** J-19, Community Based and Commercial Contraceptive Distribution: an Inventory and Appraisal, March 1978).

Not included in these tables are data on oral contraceptive use in the People's Republic of China. No Chinese data have been published either on production of steroid contraceptives or on nationwide use. Figures from selected communes given to visitors show OC use rates ranging

Table 5. Deliveries of Oral Contraceptives Financed by the Swedish International Development Authority, by Calendar Year and Area, 1974–1977
(in thousands of cycles)

	1974	1975	1976	1977	TOTAL
AFRICA					
Kenya	1,000	2,000	1,350	3,870	8,220
Subtotal	1,000	2,000	1,350	3,870	8,220
ASIA					
Korea, South	2,500				2,500
Malaysia	800				800
Sri Lanka*	550	600	600	24	1,774
Viet-Nam, Socialist Republic of	100	140	30	100	370
Subtotal	3,950	740	630	124	5,444
TOTAL	4,950	2,740	1,980	3,994	13,664

*50,000 cycles are scheduled for 1978 delivery.

Source: Ekroth, Swedish International Development Authority (50)

Table 6. Two Estimates of Number (in Thousands) and Percentage of Married Women of Reproductive Age (MWRA) Using All Methods of Contraception and Using Oral Contraceptives, by Source of Supply and Service in 36 Countries, Calculated by Population Council and US Agency for International Development, 1977

	Population Council Data						USAID Data	
	Commercial Sector		Government Sector		All Sources		Organized Programs	
	No. of Users	% of MWRA	No. of Users	% of MWRA	No. of Users	% of MWRA	No. of Users	% of MWRA
AFRICA								
Egypt[1] 1975								
All Methods					1,085	21	855.7	15.4
Orals					**555**	**11**	**587.7**	**10.6**
Ethiopia 1977								
All Methods							31.0	0.6
Orals							**30.3**	**0.5**
Ghana 1977								
All Methods			42.1	2.1	42.1	2.1		
Orals			**24.1**	**1.2**	**24.1**	**1.2**		
Kenya 1977								
All Methods							96.9	4.9
Orals							**52.9**	**2.7**
Mauritius 1978								
All Methods	4.2	3.4	61.6	49.2	65.8	52.5		
Orals	**3.7**	**3.0**	**32.9**	**26.3**	**36.6**	**29.2**		
Morocco[2] 1977								
All Methods							165.0	6.2
Orals							**125.0**	**4.7**
Tunisia 1977								
All Methods			137	17.0			199.3	21.9
Orals	**21.7**	**2.7**	**17.8**	**2.2**	**39.5**	**4.9**	**53.3**	**5.8**
Zaire 1977								
All Methods							12.2	0.3
Orals							**3.5**	**0.1**
ASIA								
Afghanistan 1977								
All Methods							23.7	1.1
Orals							**13.8**	**0.6**
Bangladesh 1977								
All Methods					1,600	8.9	1,716.6	12.8
Orals					**410**	**2.3**	**645.7**	**4.8**
Fiji 1978								
All Methods	3	3	31	34	34	38		
Orals	**2**	**2**	**5**	**6**	**7**	**8**		
Hong Kong 1977								
All Methods	164	32	234	45	316	64		
Orals	**56**	**11**	**87**	**17**	**143**	**28**		
India[3] 1977								
All Methods			24,949	23.9			26,082.0	24.4
Orals							**67.0**	**0.1**
Indonesia 1977								
All Methods			4,370	23.0			4,318.7	20.2
Orals			**2,563**	**13.5**			**2,524.9**	**11.8**
Iran[4] 1978								
All Methods	453	8.1	905	16.2	1,358	24.3		
Orals	**453**	**8.1**	**719**	**12.8**	**1,172**	**20.9**		
Korea 1977								
All Methods	1,035	21.7	1,059	22.2	2,094	43.9	1,440.2	28.2
Orals	**143**	**3.0**	**224**	**4.7**	**367**	**7.7**	**179.0**	**3.5**
Malaysia 1976								
All Methods	137	10	332	24	469	34		
Orals	**110**	**8**	**260**	**19**	**370**	**27**		
Nepal 1977								
All Methods							107.1	4.3
Orals							**29.3**	**1.2**
Pakistan[5] 1975								
All Methods					780	6	1,760.6	14.5
Orals							**695.3**	**5.7**

	Population Council Data						USAID Data	
	Commercial Sector		Government Sector		All Sources		Organized Programs	
	No. of Users	% of MWRA	No. of Users	% of MWRA	No. of Users	% of MWRA	No. of Users	% of MWRA
Philippines 1977								
All Methods			1,200	22.0	1,200	22.0	1,348.9	24.0
Orals			**560**	**10.5**	**560**	**10.5**	**468.4**	**8.3**
Singapore 1968								
All Methods	51	18	153	53	204	77.1	153.4	57.2
Orals	**9**	**3**	**40**	**14**	**49**	**17**	**40.0**	**14.9**
Taiwan 1977								
All Methods	583	27	830	38	1,413	65		
Orals	**56**	**3**	**110**	**5**	**166**	**8**		
Thailand[6] 1977								
All Methods			1,936	34.2			1,750.1	31.2
Orals			**918**	**17.3**			**642.9**	**11.5**
WESTERN HEMISPHERE								
Colombia[2] 1976								
All Methods	698.0	22.5	810	26.1	1,508	48.6	892.0	33.6
Orals	**108.8**	**3.5**	**394**	**12.7**	**502.8**	**16.2**	**409.5**	**15.4**
Costa Rica[2] 1976								
All Methods					78.8	33.7	112.0	48
Orals					**53.7**	**23.0**	**75.6**	**33**
Dominican Republic 1977								
All Methods	210	21	93	9.3	303	30.3	140.7	23.7
Orals			**60**	**6.0**			**86.5**	**14.7**
Ecuador 1975								
All Methods					51.7	6.3	96.2	12.0
Orals					**19.0**	**2.3**	**38.6**	**4.8**
El Salvador 1976								
All Methods	26	3.1	61	7.3	87	10.4	176.4	27.6
Orals	**8**	**0.9**	**32**	**3.8**	**40**	**4.7**	**52.1**	**8.2**
Guatemala 1977								
All Methods							66.9	7.6
Orals							**32.0**	**3.6**
Haiti 1976								
All Methods					41	5	192.0	19.9
Orals							**25.7**	**2.7**
Jamaica 1977								
All Methods							85.3	42.0
Orals							**46.3**	**22.8**
Mexico[7] 1976								
All Methods	800	9	1,015	12	1,815	21		
Orals	**575**	**6**	**225**	**3**	**800**	**9**		
Nicaragua 1977								
All Methods							62.2	22.5
Orals							**43.8**	**15.9**
Panama[8] 1975								
All Methods					175	44	59.8	31.9
Orals					**48**	**12**	**28.8**	**14.9**
Paraguay 1975								
All Methods							90.3	27.0
Orals							**55.1**	**16.4**
Peru[7] 1977								
All Methods							19.3	9.9
Orals							**9.6**	**4.9**
Total Orals Column	**1,546.2** **(379.7)**[10]		**6,271.8** **(1,463.0)**[11]		**5,362.7**[9]		**7,062.6**	
Estimated Total Program Use							**8,525.6**[12]	

Note: Population Council data are for January of specified year unless otherwise noted; 1978 data unpublished. AID data are for 4th quarter of 1977 unless otherwise noted.

[1] Egypt—USAID data based on 4th quarter 1976

[2] Morocco, Colombia, Costa Rica—USAID data for 2nd quarter 1977; PC, Costa Rica, women aged 20–49

[3] India—PC data as of March 1977

[4] Iran—PC estimate may not include discontinuations

[5] Pakistan—PC estimate based on World Fertility Survey: MWRA are aged 15–49

[6] Thailand—PC estimate based on World Fertility Survey

[7] Mexico, Peru—PC data as of June 1976

[8] Panama—USAID data for 3rd quarter 1977

[9] Thailand and Indonesia not included in column 5 (PC: All Sources)

[10] Excludes all countries included in column 7 (USAID: Organized Programs) and in IMS pharmacy audit (Table 1); includes Mauritius, Fiji, Hong Kong, Korea, Malaysia, Singapore, and Taiwan.

[11] Excludes countries for which USAID data are given in column 7 and 8 (USAID: Organized Programs)

[12] Total USAID OC users plus PC Government Sector OC users for those countries not included in column 7 (USAID: Organized Programs), i.e., 1,463.0.

Source: Nortman and Hofstatter (132); USAID, Office of Population (203)

Table 7. Percentage of Married Women of Reproductive Age Using Various Contraceptive Methods in Selected Developing Countries, as Reported in World Fertility Surveys, 1974–1976

		Percentage of Married Women of Reproductive Age*								
Country	Date	All Methods	OCs	Injectables	Sterilization	IUD	Condoms	Rhythm	Withdrawal	Other
ASIA										
Fiji	1974	40	8		16	5	6	2	2	1
Korea, South	1974	35	8	0.2	5	8	5	5	3	1
Malaysia	1974	33	16		4	1	3	2	2	6
Nepal	1976	2	0.4		1.6	0	0.2	0	0	0.1
Pakistan	1975	5	1		1	1	1	0	0	1
Sri Lanka	1975	33	2		10	5	2	8	2	4
Thailand	1975	33	14	2	8	6	0.4	3		
LATIN AMERICA										
Colombia*	1976	42	13		4	8	2	6	5	4
Costa Rica	1976	64	22		13	5	9	5	5	5
Dominican Republic	1975	31	8		12	3	2	1	4	2
Panama*	1976	54	17		22	4	1	2	3	5

*Aged 15–44, except in Costa Rica and Panama, 20–49

Source: World Fertility Surveys (36, 43, 45, 57, 104, 112, 127, 140, 142, 190, 203)

from 9 to 59 percent of all contracepting couples. Over 95 percent of Chinese couples are estimated to be using some fertility control method (33, 88). Table 8 gives figures, from six different communes or work sites, gathered by F. Jaffe and D. Oakley during a fact-finding trip in 1977. While there is no evidence to justify extrapolating any of these figures nationwide, they do suggest considerable pill use in China.

Under the circumstances, estimates of oral contraceptive use worldwide are highly tentative and problematical. USAID officials have suggested a figure of about 55 million women (or couples) protected from unwanted pregnancy by orals (152, 185). The figure of 54 million as calculated in Table 9 includes an extremely rough estimate for the People's Republic of China—13 percent of the total population representing married women of reproductive age (a low percentage because of late ages of marriage) and 10 percent of those married women using OCs (a rate in the same range as that of Indonesia and the Philippines). Commercial sales covered by IMS do not include Scandinavia and Eastern Europe among the developed regions and much of Latin America, the Caribbean, and South Asia among the developing countries. Therefore, these figures all have wide margins of error. They are presented here to give a basis for estimating the worldwide prevalence of OC use in 1977.

Table 8. Percent Distribution of Birth Control Methods Used in Selected Places in China, 1977

Place	OCs	IUDs	Condoms	Sterilization	No method
Peking pharmaceutical factory	34	24	24	18	0
Wan-Tou commune	11	62	1	12	14
Chang-Ching commune	9	18	0	60	13
Shanghai municipality	25	15	13	46	1
Fushan silk factory	59	17	0	24	0
Fushan ceramic factory	26	13	0	51	10

Note: The percent distribution of methods was given as shown, but it was not clear whether the totals in the different places represented all married women of reproductive age or all contraceptive users.

Source: Jaffe and Oakley (88)

Table 9. Estimated Number of Oral Contraceptive Users Worldwide, 1977

	Millions of Women	
Developed Country Users		
Commercial Sales (IMS, Table 1)	21	± 2.0
Other Commercial Sales	3	± 0.5
Government Programs	4	± 0.5
Developing Country Users		
Commercial Sales (IMS, Table 1)	4	± 0.5
Other Commercial Sales (Table 6)	1	± 0.5
Government Programs (Table 6)	9	± 2.0
People's Republic of China		
900 million people × 13% estimated MWRA × 10% estimated usage	12	± 5.0
TOTAL	54	± 11.0

EVALUATING SIDE EFFECTS

Research on the side effects of oral contraceptives, first reviewed in detail in **Population Reports** A-2 (March 1975), has continued and expanded. Hardly an obstetrics and gynecology journal appears without some mention of oral contraceptives in relation to symptoms, diseases, or laboratory measurements—reports which the popular media are quick to pass on to the public. In all languages all over the world readers are constantly warned about real or suspected hazards of steroidal contraceptives. Oral contraceptives are not only one of the world's most widely used drugs, they are also one of the most carefully scrutinized, by both medical and lay people.

Debates over methodology accompany each major study published on oral contraceptives, for, despite the volume of research, observation, and speculation, it remains difficult to reach conclusions about the relationships of OCs to various rare but serious illnesses. Therefore, most researchers are cautious about attributing previously unsuspected adverse or beneficial effects to the pill.

OCs have been known for some time to affect the risk of circulatory system diseases; particularly, they have been linked to clotting in the veins. The thrust of recent research is that OCs may affect a broader range of circulatory disorders than could be confirmed earlier, but that the increased risk may be largely confined to older women with conditions predisposing them to such diseases. These conditions include obesity, hypertension, high cholesterol levels, diabetes, and, most importantly, smoking.

The relatively low prevalence of smoking and other vascular disease risk factors in most developing areas, along with the low incidence of nonrheumatic circulatory system disease, suggests that, on the average, fewer circulatory system disorders will be associated with pill use in developing countries than in industrialized nations.

Outside the realm of circulatory system disease, recent studies reveal no substantial new risks associated with OC use. In fact, some concerns—particularly over effects on subsequent fertility and on offspring conceived after pill use—have been quieted by recent reports.

Recent Cohort Studies

Much of the knowledge of oral contraceptive effects gained in the last few years comes from ongoing cohort studies. Cohort studies—sometimes also called prospective studies—of oral contraceptives involve large numbers of women, some using OCs, some not, who are observed over a period of time to record the frequency of diseases in user and nonuser groups. The cohort study not only provides the opportunity to compare users and nonusers (often expressed as a ratio of event rates), but also indicates the absolute incidence of disease in each group. Cohort studies require extensive advance preparation, consistent record-keeping, long-term follow-up and, to study rare diseases, a very large number of participants. Thus they are difficult to organize and expensive to maintain. Ideally, participants should be designated users and nonusers on a random basis and not by individual choice. Since randomization is rarely possible with contraceptive use, the self-selection of OC users may introduce bias into cohort studies. Further, high dropout rates can raise questions about the validity of later findings. Yet cohort studies provide the most readily understood way to identify associations between contraceptive methods and health effects, especially those that had not been previously suspected, and to quantify those associations.

The three major cohort studies are the Royal College of General Practitioners' Oral Contraception Study in the United Kingdom, the Kaiser-Permanente Contraceptive Drug Study in Walnut Creek, California (USA), commonly known as the Walnut Creek study, and the Oxford/Family Planning Association (FPA) study in the UK. Early results from the first two studies were discussed at length in **Population Reports** A-2 (March 1975). In 1976, interim data from the Oxford/FPA study were published (213). The statistically significant results of the Oxford study are summarized in Figure 3. While all three are of cohort design, the studies differ in how they enrolled participants, what events they record, how they collect information, and how they report their data (see Table 10).

Case-Comparison Studies

An alternative study design is the case-comparison study (also called case-control). A group of women with a particular condition or illness (the cases) is selected, as is a comparison group of generally similar women who do not have the disease (controls). The current or previous use of oral contraceptives in the cases and controls is then compared. The controls are selected to be as similar to the cases as possible in ways likely to bear on OC use and the occurrence of the disease; if not, such potential confounding variables must be taken into account in the analysis of the data.

A case-comparison study is useful for studying rare illnesses because it does not have to wait for the cases to develop in the study population. The results of case-comparison studies are often summarized by "relative risk" estimates. These estimates actually compare OC use in cases and controls, not disease incidence; they are calculated by dividing the ratio of OC users to nonusers among the cases by the comparable ratio among the controls. Case-comparison studies cannot provide information on the overall incidence of a disease or detect previously unsuspected associations.

Vital Statistics Trends

Another method of investigating alleged relationships between OC use and disease is to look at vital statistics. Changes in the death rates from specific diseases over time can be compared with changes in OC use. Mortality rates changing in a pattern consistent with changes in OC use would raise the suspicion of an association between the two. If the trends for women of reproductive age diverged from those for men or older women in ways consistent with OC use trends, the suspicions would be strengthened. On the other hand, if mortality among women of reproductive age declined steadily or increasingly as oral contraceptive use increased—as appears to have often been the case recently—researchers would want to look more critically at the case-comparison and cohort studies and search for other evidence of cause-and-effect relationships as well as statistically significant relationships (155).

An analysis of trends cannot be expected to reveal small changes in disease incidence among OC users nor large changes either in small subgroups of the population or in groups in which OC use is rare. Furthermore, changes in other factors influencing incidence or mortality, variations or errors in diagnosis or codification of cause of death, and the difficulties of estimating OC use, especially in specific groups, make trend analysis difficult. Nevertheless, although it is not a substitute for cohort and case-comparison studies, it is a useful ancillary approach and check and would reveal whether any major increase in deaths due to OC use were occurring.

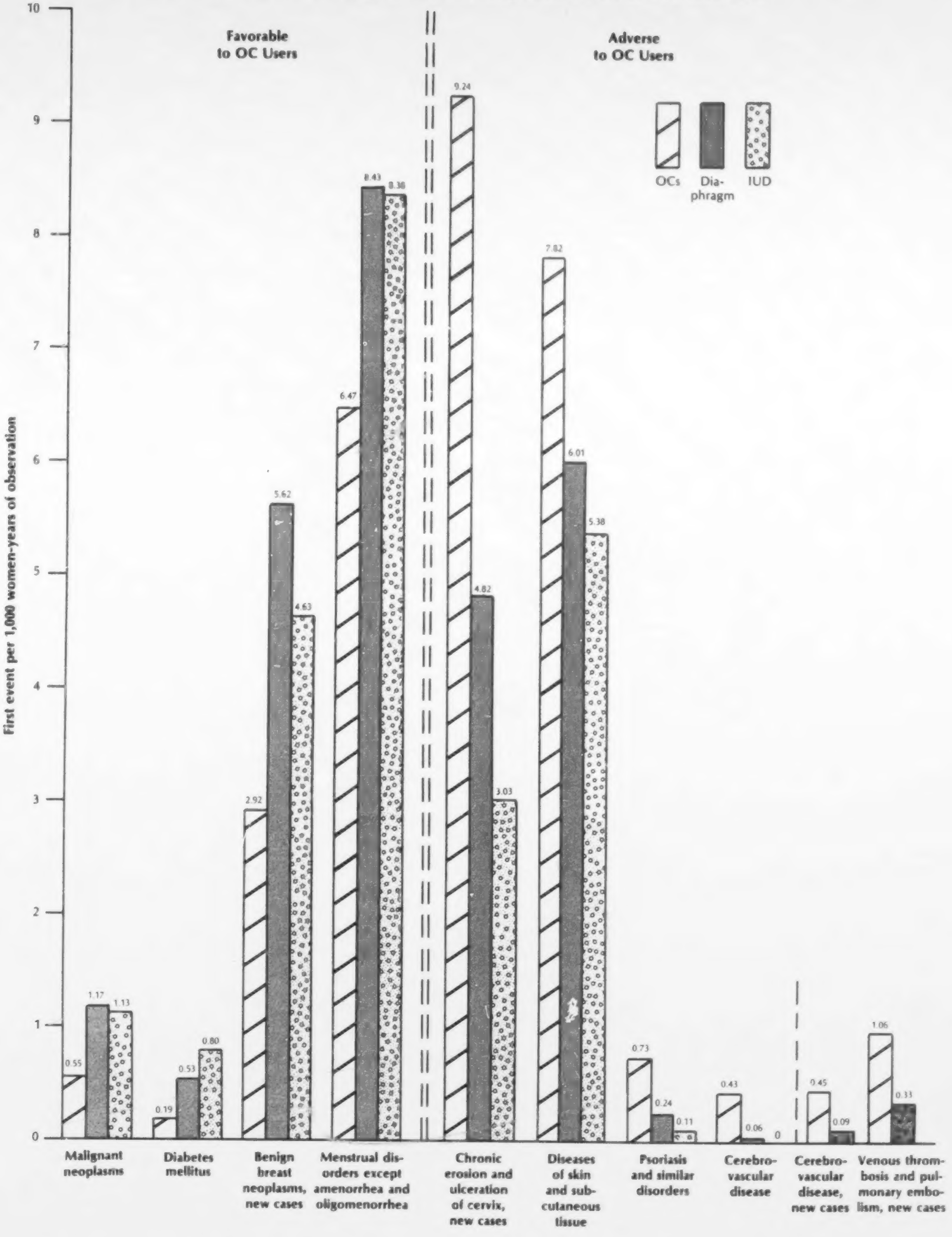


Figure 3. Rates of Various Conditions in Users of Oral Contraceptives, Diaphragms, and IUDs in the Oxford/Family Planning Association Study, 1968-1975

Conditions are shown for which the rate for users of oral contraceptives differed significantly ($p < 0.05$) from rates for diaphragm or IUD users. Contraceptive use status was determined by method in use at entry into study, except for cerebrovascular disease and venous thrombosis (at extreme right), which were calculated on the basis of the method actually used during follow-up, and which compare OC users with users of diaphragms and IUDs combined. Conditions for which significant differences appeared to be attributable largely to initial choice of method rather than to subsequent use are excluded. Based on 31,076 woman-years of observation of OC group, 14,739 of diaphragm group, 10,014 of IUD group. Rates standardized for age, parity, social class, and smoking.

Source: Vessey et al. (213)

Risk Estimates

Several points should be kept in mind when looking at epidemiologic studies and at the relative risk estimates or the mortality or incidence rates or ratios that are used to summarize their findings. First, epidemiologic studies do not prove causation. A determination of cause and effect is a conclusion based on consideration of many factors, including but not necessarily limited to epidemiologic evidence (78,111) (see **Population Reports** A-4, p. A71). An association might be noncausal, as, for example, when OC users have more bronchitis than nonusers—not because OCs cause bronchitis, but because OC users are more likely to smoke. Also, OC users in developed countries tend to have more contact with physicians than do other women, and physicians may treat suspected illnesses in OC users more carefully. A US study found, for example, that OC users were hospitalized 20 to 40 percent more often than nonusers, even for complaints unrelated to OC use (79). Similarly, the strength of any association between drugs and a health problem can be exaggerated by selecting controls less likely to bring their symptoms to the attention of a physician (80).

Second, the fewer the cases studied, the wider is the margin of error in estimated risk. For example, in the Royal College study it was calculated that mortality rates from circulatory system diseases were 4.9 times higher for OC users than for nonusers. With only 29 deaths to analyze there is a 95 percent chance (e.g., a 95 percent confidence interval) that the actual figure is somewhere between 1.7 and 14.0 instead of exactly 4.9. There is a 5 percent chance that this risk is less than 1.7 or more than 14.0 times the risk for nonusers (23,169).

Third, a rate ratio or relative risk estimate needs to be put in context. These summary measures compare two groups; they do not convey information about the incidence of disease in OC users or nonusers. For example, to put into context the recent finding of five times greater mortality in OC users than in never users (169), D. May pointed out that this rate ratio means that pill use decreased the chances of survival during a year from 99,995 per 100,000 to 99,974 per 100,000—a reduction of a negligible two-hundredths of a percent (121). Furthermore, as a recent WHO report pointed out:

> It is also important to bear in mind the frequency of the disease. For example, if the incidence of a disease is 1 per million among non-exposed persons, and the use of a particular drug increases the relative risk of disease tenfold, then one would anticipate 10 cases per million users of the drug. On the other hand, if the incidence of another disease is 100 per

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Table 10. Characteristics of Major Cohort Studies of Oral Contraceptives

Name, Year Initiated	Ref. No.	Source of Participants	Age Range	Number Enrolled	Information Recorded	Length of observation (as of most recent report)
Royal College of General Practitioners' Oral Contraception Study, 1968	167, 170	Patients of 1,400 volunteer general practitioners in the UK	15–49	Current OC users: 23,611 Never OC users: 22,766	Physicians' routine diagnoses	OC users (includes those beginning use during study): 60,632 woman-years Former users, abandoning OC use during study (not including resumption of use): 35,992 woman-years Never users (excluding experience after any started OCs during study): 110,065 woman-years
Oxford/Family Planning Association study, 1968	213, 215	Clients of 17 clinics in the Family Planning Association (UK)	25–49	17,032 total. OCs: 56% IUDs: 19% diaphragm: 25%	Answers to questions asked at return visits to clinics	By method at entry, regardless of subsequent methods: OCs: 49,681 woman-years IUDs: 16,209 woman-years Diaphragms: 22,937 woman-years
Kaiser-Permanente Contraceptive Drug Study, 1969	24, 25, 145	Women receiving general check-ups at Walnut Creek, California, clinic, 1969–1971	18–58	16,579 total	Answers to periodic mail & telephone questionnaires, diagnoses on return visits, clinic & hospital records	OC users: 65,000 woman-years of actual use Never users: 35,885 woman-years of observation
Boston area survey, 1970, 1973	79	Women residents of Boston (USA) area	26–50	1970: Ever OC users: 19,682 Never OC users: 46,161 1973: Ever users: 12,483 Never: 11,658	1970: 1969 hospitalizations 1973: 1970–1972 hospital-	1970: One year (1969) for each woman 1973: Three years (1970–72) for each woman

> million, and drug exposure increases the risk only twofold, then one would anticipate 200 cases per million among users of the drug. This latter situation would clearly entail a greater public health problem, even though the relative risk is much smaller (201).

The seriousness of the disease must also be kept in mind. A slight decrease in a life-threatening condition like breast cancer, for instance, would outweigh a large increase in skin disease. Also, an awareness of the morbidity and mortality associated with other conditions, including pregnancy, can provide a perspective from which to judge the context of and alternatives to specific disease risk, as can comparisons with the risks and benefits of common activities that are not health-related, such as traveling, engaging in sports, or using tools and machinery.

Fourth, and most important to the interpretation of recent studies on OCs and vascular diseases, risk estimates are averages. They summarize and compare the experience of a whole group of study participants, for example, British women utilizing specific clinics or physicians. Like all averages, they tend to obscure the range they summarize. They do not apply to any specific subgroups that differ from each other in important ways. Further, if another factor acts synergistically with OC use—as appears to be the case with smoking in some circulatory system diseases—the statistical procedure of standardizing for that other factor will not remove its effect on a risk estimate. Stratification—examining separately those with the risk factor and those without—is necessary to accomplish that. Even then, when the increased risks are heavily concentrated in certain subgroups—such as women over 35 who smoke—it is difficult to determine accurately what the risks are for other subgroups, who may experience little change in risk. **The most important practical implication of recent studies on oral contraceptives and circulatory system diseases, reviewed below, is that different women face different risks in using OCs and that those facing special risks can now be more easily identified.**

CIRCULATORY SYSTEM DISEASE

The most disturbing findings of the two British cohort studies relate to circulatory system disease. Both the Royal College study and the Oxford/Family Planning Association study found that oral contraceptive users died from vascular disease at a higher rate than nonusers. Furthermore, a broader range of diseases was involved than had been previously found in case-comparison studies and earlier cohort data. The Royal College study also indicated that mortality rates increased with duration of oral contraceptive use and that even in women who discontinued orals the rate of mortality from circulatory disease was higher than in women who had never used them. Both analyses noted that a high proportion of the deaths in each study population was among women who smoked (see "Smoking, OCs and Circulatory System Disease," p. A-162 below).

As Table 11 shows, there were 101 deaths from all causes among the 46,000 women in the Royal College study—56 among women who had ever used the pill and 45 among the never users. The ever users had an overall death rate of 58.0 per 100,000 women-years compared with 40.9 for never users—a 40 percent difference. Twenty-four of the 56 deaths among pill users were attributed to circulatory disease in the categories of nonrheumatic heart disease, hypertension, and cerebrovascular disease, for a death rate of 25.8 per 100,000 woman-years, whereas only five of the never users died from circulatory disease, for a death rate of 5.5 per 100,000. The ratio of mortality rates for ever users as compared with the never users was therefore 4.7 to 1; in other words, 4.7 times higher in users. Comparing current users and never users the risk ratio was 4.9 to 1; comparing past users with never users, 4.3 to 1 (169).

Table 11. Rates of Mortality (per 100,000 Woman-years) from Various Causes, by Oral Contraceptive Use, in United Kingdom Cohort Studies, 1968–1977

	Royal College Study					Oxford/FPA Study				
	Ever users		Never users		Rate ratio (users/ never users)	OC users at entry		Diaphragm & IUD users		Rate ratio (OC users/ others)
Cause of death	Rate	No.	Rate	No.		Rate	No.	Rate	No.	
All neoplasia						21.6	10	28.3	12	0.8
All cancers	15.8	14	21.1	20	0.8					
All circulatory disease	25.8	24	5.5	5	4.7**	13.6*	7*	0	0	—
Nonrheumatic heart disease and hypertension	10.4	11	2.5	2	4.0*	9.8	5	0	0	—
Cerebrovascular disease	13.2	10	2.8	3	4.7*	3.8	2	0	0	—
Accidents and violence	17.1	16	10.0	9	1.7	3.4	2	6.8	2	0.5
Other causes	3.0	2	7.8	9	0.4	11.1	5	6.8	3	1.6
Total†	58.0	56	40.9	45	1.4	49.7	24	41.9	17	1.2

*$p<0.05$ **$p<0.01$

† Except for this category, all rates are standardized for age at entry into the study, parity, social class, and smoking. Standardization causes small discrepancies between individual and total rates.

Source: Royal College of General Practitioners' Oral Contraception Study (169); Vessey et al. (215)

While the ratio of mortality rates is similar to previous estimates of relative risks for specific circulatory system diseases (see **Population Reports** A-2), the difference in absolute mortality rates between users and nonusers is greater than would have been predicted on the basis of previous research (see Table 12*). The absolute risk was not the same for all women, however. Age, smoking, and duration of OC use all greatly affected the risk of death in the Royal College study, as shown in Table 13. For example, women over 45 died from circulatory system disease at the rate of 140 per 100,000 woman-years of OC use, as compared with 7.5 deaths per 100,000 for younger women, aged 15–24. For users who smoked the death rate was about 40 deaths per 100,000 compared with 14 per 100,000 among ever users who did not smoke.

Even these estimates do not entirely disaggregate the effects of various factors; for example, the difference in mortality rates for young nonsmokers using the pill for a short period would be less than any of the estimates shown in Table 13. Further disaggregation is difficult and, because of small numbers, would be hard to interpret. For example, the researchers note that "because of the small number of deaths in the nonsmokers only the excess deaths in smokers is statistically significant" (169).

With less than half as many woman-years of follow-up as the Royal College study, the Oxford/FPA study published in *Lancet* at the same time reported fewer deaths—43 compared with 101—but the distribution of mortality seemed to bear out some of the Royal College findings (215). All nine deaths due to circulatory disease occurred in women who were OC users when they entered the study. Seven were still users when they developed the illnesses that led to their deaths. Six smoked more than 10 cigarettes per day. The rate of mortality from all circulatory disorders in OC users was 13.6 per 100,000 woman-years of observation. (Two deaths were deleted from the analysis and from Table 11 because at the time of their deaths they were no longer participating in the study.) This figure is only half as large as the 25.8 per 100,000 mortality rate from circulatory disorders for ever users in the Royal College study. These differences arise from differences between the two populations studied and from the wide margin of error inherent in measurements based on a small number of deaths.

The Kaiser-Permanente Contraceptive Drug Study in Walnut Creek, California, will include data on circulatory system disease in its participants in a report expected in 1979.

In summary, in the larger British study, OC users' rates of death from circulatory system disease were high—about 40 per 100,000 women-years of observations—for both smokers and women over 35 and much lower—under 15 per 100,000—for nonsmokers and women under 35. In the smaller Oxford/FPA study, seven out of nine of the deaths were among women who smoked and seven of the nine women were 35 or older. There were no circulatory disease deaths among nonsmokers under age 35.

Table 13. Rates of Mortality (per 100,000 Woman-years) from Circulatory System Diseases, by Age at Death, Smoking Habit at Entry into Study, and Duration of OC Use, in the Royal College Cohort Study

	Ever Users	Controls	Absolute Difference
Age			
15–24	7.5	0	7.5
25–34	8.8	4.4	4.4
35–44	42.6	9.6	33.0
45–49	140.9	0	140.9
Smoking Habit			
Nonsmokers	13.8	3.0	10.8
Smokers	39.5	8.9	30.7
Duration of OC Use in Months*			
1–59	17.5	5.2	12.3
60+	50.5	5.2	45.3

*Age standardized

Source: Royal College of General Practitioners' Oral Contraception Study (169)

Subarachnoid Hemorrhage

The most striking finding of the Royal College mortality study (169) was the difference in deaths due to subarachnoid hemorrhage, a type of stroke thought to occur usually from rupture of congenitally weak walls of cerebral blood vessels. Five OC users (9.3 per 100,000 woman-years) and four former users (15.9 per 100,000 woman-years) died of subarachnoid hemorrhage, while none of the nonusers did. This accounted for roughly one-third of all nonrheumatic circulatory system disease deaths in users and one-half in former users (169). In the Oxford/FPA study, one death, in an OC user, was attributed to subarachnoid hemorrhage (215). The Royal College data suggest not only a link between OC use and subarachnoid hemorrhage, but also an effect that persists after a woman stops using OCs. Persistent effects had not been reported previously with any other circulatory system disease associated with oral contraceptives (see Table 14).

The Walnut Creek study in California has recently reinforced the Royal College data with evidence that the ratio of OC users to nonusers among 11 women hospitalized for subarachnoid hemorrhage was 6.5 times higher than the ratio among other study participants of the same age (144). Risk seemed to increase with duration of use. As in the Royal College study, a difference in risk persisted for former users in the Walnut Creek study—a relative risk of 5.4. In both studies, however, the numbers are small, and the evidence of a lingering risk does not yet seem conclusive. The Walnut Creek study revealed that smoking is also implicated in subarachnoid hemorrhage and, in fact, acts synergistically with OC use to increase dramatically the risk of the disease. The small number of cases among nonsmokers (three) made it impossible to determine relative risk for them separately. (See Table 15*.)

Subarachnoid hemorrhage accounts for about one-third of cerebrovascular disease deaths in US women of reproduc-

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*Table 12, which summarizes selected studies of various circulatory system diseases and oral contraceptive use, appears on p. A-172.

*Table 15, which summarizes selected studies of venous thromboembolism, stroke, and oral contraceptive use, appears on p. A-174.

Table 14. Aspects of Various Circulatory System Diseases and Their Association with Use of Oral Contraceptives

Disease	Duration of use effect	Dose-response relationship	Persistence after OC use stops	Other known risk factors	Synergism of OCs with other risk factors
Myocardial infarction	Uncertain	Uncertain	No	Smoking Hypertension Hypercholesterolemia Diabetes	Yes Uncertain Uncertain Not studied
Venous thrombosis or pulmonary embolism	No	Estrogen Progestin ?	No	Smoking ? Diabetes Hypertension	Possibly not Possibly No
Cerebral thrombosis	Uncertain	Estrogen	No	Hypertension	No
Hemorrhagic stroke	Not studied	Not studied	Not studied	Hypertension Smoking	No Yes
Subarachnoid hemorrhage alone	Possibly	Not studied	Possibly	Smoking	Yes
Hypertension	Uncertain	Estrogen Progestin	No		

tive age. In this age group death rates are less than 10 per 100,000 and have declined since 1968 (see Figure 10). The fact that mortality rates for subarachnoid hemorrhage do not continue to rise with age for women past reproductive age, as they do for other circulatory system diseases, is a hint that natural hormones may play some role in the disease, but the problem of distinguishing subarachnoid hemorrhage from other strokes makes mortality data particulary susceptible to trends in diagnosis and, indeed, makes all epidemiologic studies of particular types of stroke difficult.

Heart Attack

In 1975 and 1976, a series of papers from Britain by J.I. Mann and colleagues provided the first strong evidence for a link between oral contraceptive use and heart attack. More recently US case-comparison studies have reinforced the British findings. Mann and colleagues studied separately both survivors of myocardial infarction and those who died from the illness (115, 116, 117, 118). In both studies, the relative risk of OC use for heart attack cases was approximately three (116, 117, 118) (see Table 16*).

The US studies show the same relationship, but varying degrees of risk. Two studies by L. Rosenberg and colleagues, after adjustment for other risk factors, estimated relative risks for OC use of less than two. The difference was statistically significant in the larger study (159 cases) (160), but not in the smaller (34 cases) (158, 159). A more recent report on 26 US cases and 59 controls found a much larger difference in OC use between the two groups: a relative risk of 14 (94). Although these women, unlike those in the other studies, did not have other conditions which might have increased their risk of heart attack (such as hypertension or diabetes), all but two were cigarette smokers. This would have independently increased their risk of heart disease. Only a very few young women who are nonsmokers have had heart attacks in any of these studies.

Mann and Inman could not associate risk of heart attack with estrogen dose in oral contraceptives (115), although an earlier study, based on a comparison of OC sales data and use patterns in women with circulatory system diseases, had suggested such a relationship (84). Indirect evidence from the Walnut Creek study suggests that heart attack risk may be related to the individual formulation of each oral contraceptive, with both the progestin and estrogen components playing roles. Looking at the level of high-density-lipoprotein (HDL) cholesterol in the blood sera of 4,978 women, 592 of them OC users, D.D. Bradley and colleagues found that the levels rose with estrogen dose and declined with progestin dose, although to varying degrees for different progestins, so that each contraceptive formulation had a unique effect (30). The net effect of some formulations was to raise HDL cholesterol levels; of others, to lower it; of still others, to cause no significant change from levels in nonusers.* Low levels of HDL cholesterol have been associated with high risk of coronary heart disease (66, 123, 156). The relationship of OCs and HDL cholesterol levels has appeared to be contradictory in other studies (10, 105), but when specific formulations are considered, the relationships seem to accord with the Walnut Creek findings (186).

Mann and colleagues' studies of fatal heart attacks illustrate the potential pitfalls of quantifying risk in epidemiologic studies. Initially half the available death certificates of women aged 40-44 were reviewed. Based on these 54 cases, researchers estimated a relative risk of approximately five; for women under age 40, the estimate was approximately three (115). On the basis of these findings, the US Food and Drug Administration (USFDA) added to the mandatory language that appears on OC package labelling in the USA a recommendation that women over age 40 "be urged to utilize other forms of contraception" (206). Subsequently, Mann and colleagues examined the rest of the available data on cases aged 40-44. Adding another 54 cases to their analysis lowered the relative risk estimate to 2.8—virtually identical to the estimate for younger women (117). The apparent effect of age on relative risk had disappeared. If, by chance, Mann and colleagues had analyzed the latter cases first, they would have found no association between heart attack and pill use. The USFDA's warning to older women is not unfounded because absolute rates of myocardial infarction rise with age in both users and nonusers. Nonetheless, the basis for the recommendation is not as strong as it first appeared.

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*Table 16, which summarizes selected studies of myocardial infarction and oral contraceptive use, appears on p. A-177.

*Of the two oral contraceptives distributed by USAID, Norinyl 1+80 (®Syntex (F.P.) Inc., Humacao, Puerto Rico) increased HDL cholesterol levels significantly ($p < 0.05$), and Norinyl 1+50 (®Syntex) increased levels very slightly and not significantly.

Mann and colleagues estimated on the basis of their studies that in England and Wales the mortality from heart attack attributable to OCs would be about 3.5 per 100,000 annually in women aged 30-39 (115). However, given the fact that, among heart attack survivors studied, nearly all cases either smoked or had other predisposing factors (118), this estimate would appear to be applicable only to women with one or more risk factors—perhaps 30 percent of women aged 30-44, judging by the control group (135). If so, attributable mortality in England and Wales might average about 2.5 per 100,000 annually in the 30-39 age group. It would be higher in older women and lower—perhaps much lower—among younger women. In the US, where fewer women smoke, and the types of pills used are more often those which depress HDL cholesterol levels less or elevate them more than do those used in Britain (186), heart attack mortality attributable to OCs would be even less. For the individual, it is clear that her risk depends greatly on whether she has any of the traditionally recognized risk factors for heart attack. Estimates of attributable mortality derived from work by A.K. Jain are 7.6 deaths per 100,000 OC users annually among smokers but only 0.4 among nonsmokers (89).

Venous Thromboembolic Disease

Venous thromboembolic diseases were the first circulatory system illnesses suspected of an association with oral contraceptive use (97). Today this association seems firmly established; the findings of British and US case-comparison studies of the late 1960s and early 1970s have been confirmed by the three major ongoing cohort studies (see Table 15). The Royal College study, after almost 34,500 woman-years of observation of OC users and over 47,000 of nonusers, reported first occurrences of deep leg vein thrombosis more than four times more often in users than in nonusers, even when no one in either group had predisposing conditions. Less than one case (0.82) developed per 1,000 woman-years of OC use. Far less serious superficial thrombosis of the leg occurred about 2.5 times more frequently in users than in nonusers, and at a rate of about 1.9 per 1,000 woman-years in OC users. There is no evidence that the effect persists after OC use stops (170).

Similarly, the Oxford/FPA study found that slightly more than one first diagnosis of venous thromboembolism occurred per 1,000 woman-years of OC use. The rate for IUD or diaphragm users was about one per 3,000 (213). A case-comparison analysis of data from Walnut Creek also found a significant link between venous thromboembolic disease and OCs when the condition occurred in women without predisposing factors. The ratio of OC users to nonusers was 7.7 times higher in the cases than in the controls (146).

The risk of venous thromboembolic disease has long been thought to be tied to the estrogen dose in oral contraceptives (84). This observation was reaffirmed by a 1975 US case-comparison study (192) and the interim report from the Royal College (167). A more recent Royal College report, however, found the estrogen dose effect limited to superficial vein thrombosis of the leg and not applicable to deep vein thrombosis (170). Such an analysis is difficult, the researchers point out, because there are two different estrogens in oral contraceptives, which may have differing effects and which interact with various progestins in different ways (46). Furthermore, the effect of OCs may be influenced by the progestin component as well. Among women using oral contraceptives containing the same dose of the same estrogen but three different doses of the same progestin, rates of superficial vein thrombosis, but not deep vein thrombosis, rose with the progestin dose (see Table 15). This relationship with progestin dose had not been reported previously (170).

The basic positive association between OCs and venous thromboembolism is supported by laboratory as well as epidemiologic evidence. Using plasma fibrinogen chromatography to detect "silent" thrombi—that is, thrombi without clinical manifestations—US researchers examined blood samples from 154 women before and during oral contraceptive use. Silent thrombi were discovered four to five times more often during OC use than before. The researchers point out that this parallels the ratio of diagnosed venous thromboembolic disease reported from epidemiologic studies of OC users and nonusers (4). British researchers, using the uptake of radioactive fibrinogen at sites of deep vein thrombosis to detect the disease, found post-operative deep vein thrombosis in 6 of 31 users but in none of 19 similar nonusers (175).

Since the association of venous thromboembolism and OC use has been widely known for a decade, users of oral contraceptives may be more likely than nonusers to see a doctor for leg pain and to have their symptoms attributed to thromboembolic disease. Recently, researchers in the US, using an objective diagnostic method to look for thrombi in women referred to them with clinical diagnoses of venous thrombosis, found thrombi in only 16.7 percent of 54 OC users but in 30.7 percent of 75 nonusers. The implication is that physicians attribute symptoms to thromboembolism more readily in OC users than in nonusers (15). If this type of bias operated in an epidemiologic study, it would tend to inflate the estimate of risk associated with OC use.

Explorations into the mechanism of thrombus formation in OC users continue to associate changes in various characteristics of the blood with OC use (14, 31, 72), but how those changes might lead to thrombus formation is still not known.

The overall excess mortality from venous thromboembolism that has been attributed to the pill is about 2 to 3 per 100,000 women annually. Studies have not shown that duration of use increases this risk.

Hypertension

No startling new information regarding the relationship of oral contraceptives and hypertension has emerged in the last few years. Studies have confirmed what was thought earlier: while using oral contraceptives most women have slightly higher blood pressures than do nonusers, but blood pressure drops after use is discontinued. In a few this rise will result in a diagnosis of hypertension, the number depending upon the criteria chosen to define the disease (see Table 17*). The issues remaining unresolved involve the roles of the two pill components, the estrogen and the progestin, and whether blood pressure continues to rise as the duration of use lengthens.

The Walnut Creek researchers looked extensively at blood pressure and diagnoses of hypertension in 13,358 women (58). A comparison of users with women who had never used OCs showed systolic readings averaging about 4.5 mm Hg higher in the users and diastolic readings about 1.5 mm Hg higher. About four percent of users, compared with 1.5 percent of never users, were diagnosed as having high blood pressure (>140/90 mm Hg). After discontinuation, mean blood pressures and the percentage diagnosed as having high blood pressure both were lower in former users than in never users.

The study also looked at women who changed contraceptive method. Women who began using OCs experienced a rise of about 4 mm Hg in systolic pressure and about 1 mm Hg in diastolic pressure. Women who abandoned oral contraceptives experienced decreases slightly larger than the increases. The data suggest that these changes are roughly the same in all women, rather than the result of a few extreme cases influencing the averages (58). In fact, women who developed hypertension or preeclampsia during pregnancy, and so might seem particularly susceptible to hormone-induced blood pressure changes, have not proved particularly likely to develop hypertension while using OCs (147).

The Walnut Creek study found no increase in blood pressure with lengthening duration of OC use. Other studies have, however. In the Royal College study, diagnoses of high blood pressure during the first year of OC use differed little between user and never-user groups, but rose steadily with longer use of OCs to 2 to 2.5 times higher in the fifth year of use than in the first (167). The Boston area mail survey of the early 1970s also detected an apparent increase in the hospitalization rate for hypertension that was correlated with length of OC use. Perhaps 20–40 percent of the difference may have been due to OC users generally being hospitalized more frequently than nonusers (79).

In contrast to most other major studies, the Oxford/FPA cohort study detected no significant difference in hypertension rates among its three groups of participants—OC users, diaphragm users, and IUD users (213). First diagnosis of hypertension occurred at a rate of about 1.6 per 1,000 woman-years among OC users, about 1.7 among diaphragm users, and about 0.7 among IUD users.

Figure 4. Packaging of oral contraceptives and other pharmaceuticals, originally performed only in developed countries, is gradually being shifted to the developing countries.

While OC-related blood pressure changes are slight and apparently reversible, any rise in blood pressure means some increase in the risk of stroke and coronary artery disease; there is no threshold beyond which high blood pressure suddenly becomes dangerous. In some cases, women already at high risk of developing stroke or heart disease—because of smoking, obesity, low glucose tolerance, a history of arterial disease, or high lipid levels in the blood—might wish to avoid the slight increase in blood pressure associated with OCs.

Initially, research suggested that the estrogen component of the pill was responsible for the rise in blood pressure (44, 187). But a recent report from the Royal College study implicated the protestin component as well. Among study participants were women using three different oral contraceptives, all with the same amount of the same estrogen but with varying amounts of the same progestin. The rates of first diagnoses of hypertension in the groups rose with the amount of progestin in their pills (168) (see Table 17).

In summary, blood pressure appears to rise during OC use but to decline after discontinuation, sometimes to levels slightly below those before OC use began. In the Walnut Creek study 4 percent of users, compared with 1.5 percent of nonusers, were diagnosed as having high blood pressure (58). Reports on whether blood pressure rises with duration of use are in conflict. To what extent higher blood pressure during OC use contributes to excess mortality in OC users and whether lower blood pressure after discontinuation remains lower and so contributes to reduced mortality later are still unresolved questions.

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*Table 17, which summarizes selected studies of hypertension and oral contraceptive use, appears on p. A-179.

VITAL STATISTICS TRENDS

Mortality rates provide an additional source of evidence on OC use and circulatory system disease, but their analysis has been relatively neglected. Of the few studies published, most have dealt with venous thromboembolic diseases in the United States or in England and Wales. These studies found trends during the 1960s consistent with the contention that OC use increased mortality from these diseases. Studies of mortality rate trends for other circulatory system diseases produced mixed findings (see Table 18*).

The increased risk of death from circulatory system disease which the British and US cohort studies now associate with oral contraceptive use has posed with new urgency the question: are these estimated increases, which would multiply the risk of death from circulatory disease among OC users by a factor of five, reflected in higher death rates in countries where a high proportion of women have used orals?

To answer this question, R.T. Ravenholt and W. Rinehart have prepared charts of age-specific mortality rates for several circulatory system diseases (154, 155). Some of these charts are presented as Figures 5–12. An inspection of these charts on female mortality from circulatory system diseases in the United States, England and Wales, and Denmark during the last two decades does not suggest major changes in death rates attributable to OC use (see Figures 5, 7, and 8). In the United States, mortality rates for all circulatory system diseases decreased in the 1950s more rapidly in younger women than in older groups. Then in the 1960s the rapid declines moderated for women aged 25–44. In the 1970s, rates of mortality from all circulatory diseases have shown rapid and parallel declines for all age groups despite the fact that OC sales increased by roughly one-third during the early 1970s. Sharply declining death rates for hypertension contributed substantially to the decline (see Figure 6). In England and Wales, all age groups except the oldest (75 years and older) show death rates declining at similar paces. In Denmark, trends for the three 10-year reproductive age groups diverge. In none does the trend seem compatible with a major impact of OC use, which began in 1966. The failure of mortality to fall among Danish women aged 35–44 would be consistent with an effect of OC use among this more susceptible age group. Rates of use in this age range may be low, however, and the trend parallels those for older age groups. Therefore the meaning of the trend is unclear.

What appears to be a discrepancy between vital statistics trends and the risk estimates of recent cohort and case-comparison studies is beginning to draw the attention of researchers. As H. Ory of the US Center for Disease Control recently pointed out:

> Applying the age-specific death rates from the Beral report [Royal College of General Practitioners' Oral Contraception Study (169)] to the United States women, I estimate that nearly three-quarters of the cardiovascular disease deaths occurring annually in the United States to women of reproductive age would be attributable to OC use. This does not seem possible.
>
> US vital data showed that cardiovascular disease death rates have been falling nearly equally and steadily for men and women of reproductive ages since 1950. If OCs were as powerful a cause of cardiovascular disease as Beral's results suggest, I would expect death rates from these diseases to diverge for men and women (136).

To put the point in an even more elementary fashion, in 1960 the US death rate for circulatory system diseases was approximately 20 per 100,000 women aged 25–34. By 1975, the apparent peak year of oral contraceptive usage in the US, about one-fifth of all women aged 25–34 were using OCs. The Royal College study calculates a risk ratio of two, that is, a doubling of death rates from circulatory disease among OC users in this age group. Applying that ratio to the 1960 US death rates would, other things being equal, lead one to predict a 1975 US circulatory disease death rate of 24 per 100,000 aged 25–34.

$$\underbrace{(20/100{,}000)(4/5)}_{\textbf{Nonusers}} + \underbrace{(2 \times 20/100{,}000)(1/5)}_{\textbf{Users}} = 24/100{,}000$$

Actually, in 1975, the circulatory disease death rate for US women aged 25–34 was only about 12 per 100,000, 40 percent lower than in 1960 before OCs were used, rather than 20 percent higher, as predicted. Obviously other factors are also influencing these death rates, including changes in diet, exercise, and medical care, but if the risks of OC use in the US were of the magnitude that the Royal College study suggests, it would be necessary to hypothesize that these countervailing changes were even greater in magnitude in order to cancel out any increases in mortality caused by OC use.

Cerebrovascular Disease

In the Royal College study (169) nine of the deaths from circulatory system disease among OC users (and none among never users) were attributed to subarachnoid hemorrhage. Thus vital statistics trends for cerebrovascular diseases deserve particular attention. Mortality rates for cerebrovascular diseases as a group remained fairly constant among US women under age 40 throughout the 1950s and most of the 1960s. Recently, however, they have declined at a pace similar to those for older women, joining the trend these rates have exhibited over the last 25 years (see Figure 9). In England and Wales mortality from cerebrovascular disease among young women has changed little since OCs became available in 1961 (see Figure 11).

In Denmark the trend has been toward increasing mortality rates for cerebrovascular disease for females aged 35–54 during the 1970s, while the rates for the over-55 age groups steadily declined (see Figure 12). These trends would be consistent with an OC effect but are inconsistent with those in the United States and England and Wales.

US mortality rates for subarachnoid hemorrhage increased for all age groups over age 20 during the 1950s and 1960s but have decreased for all age groups during the 1970s (see Figure 10). The beginning of the decline seems to precede the recent drop in OC use in the USA.

L.P. Chow, looking at the prevalence of pill use and rates of mortality from stroke in Taiwanese women, found no significant correlations in any of the five-year age groups between 20 and 49. He concluded that the pill has not had an apparent adverse effect on female mortality from stroke in Taiwan. Less than five percent of married women in any five-year age group, however, used orals during this period. Mortality rates for women declined slightly since

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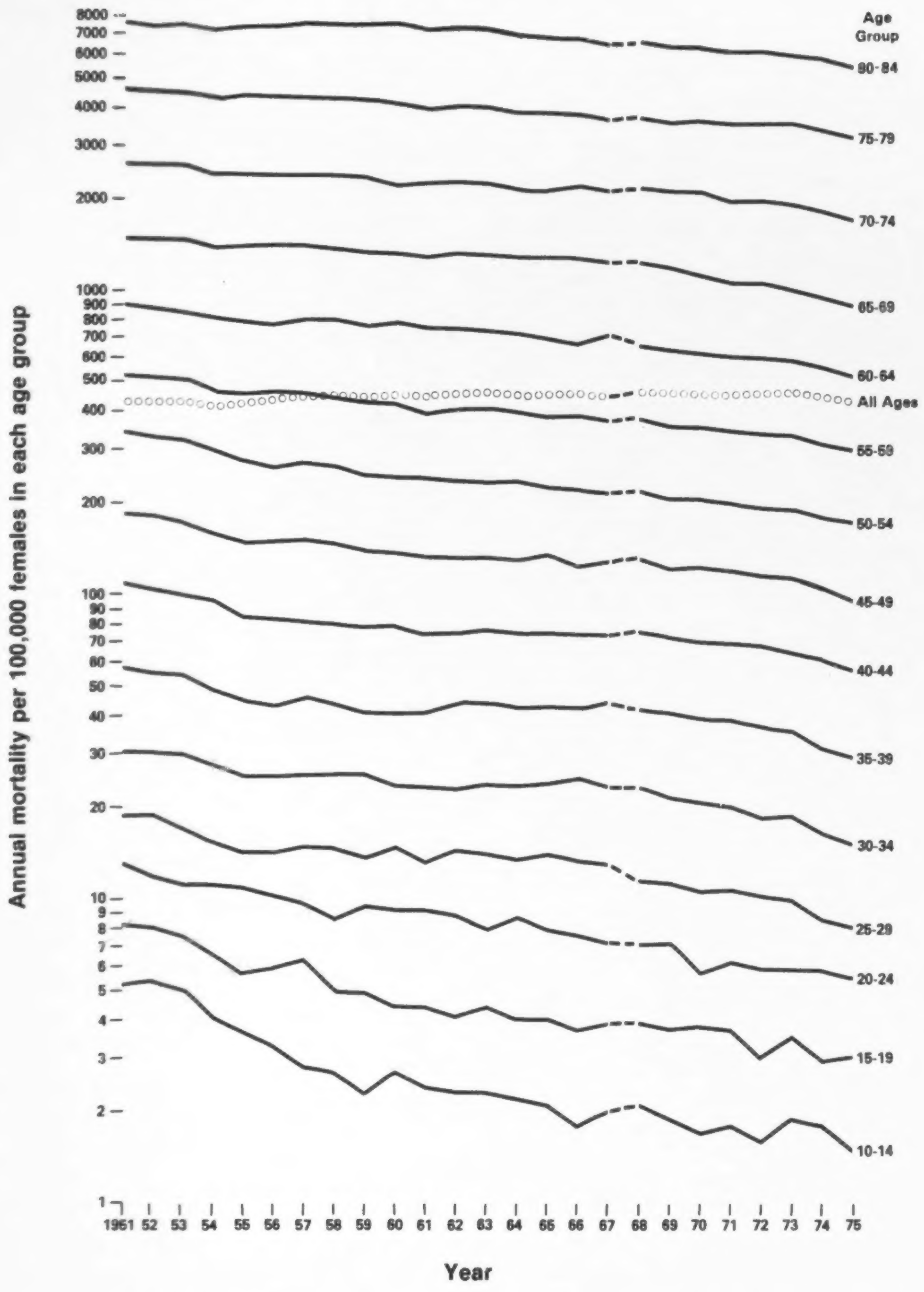
*Table 18, which summarizes selected studies of trends in vital statistics and oral contraceptive use, appears on p. A-181.

Figure 5. Mortality from All Circulatory System Diseases,* Females, Aged 10–84, by 5-Year Age Groups, USA, 1951–1975

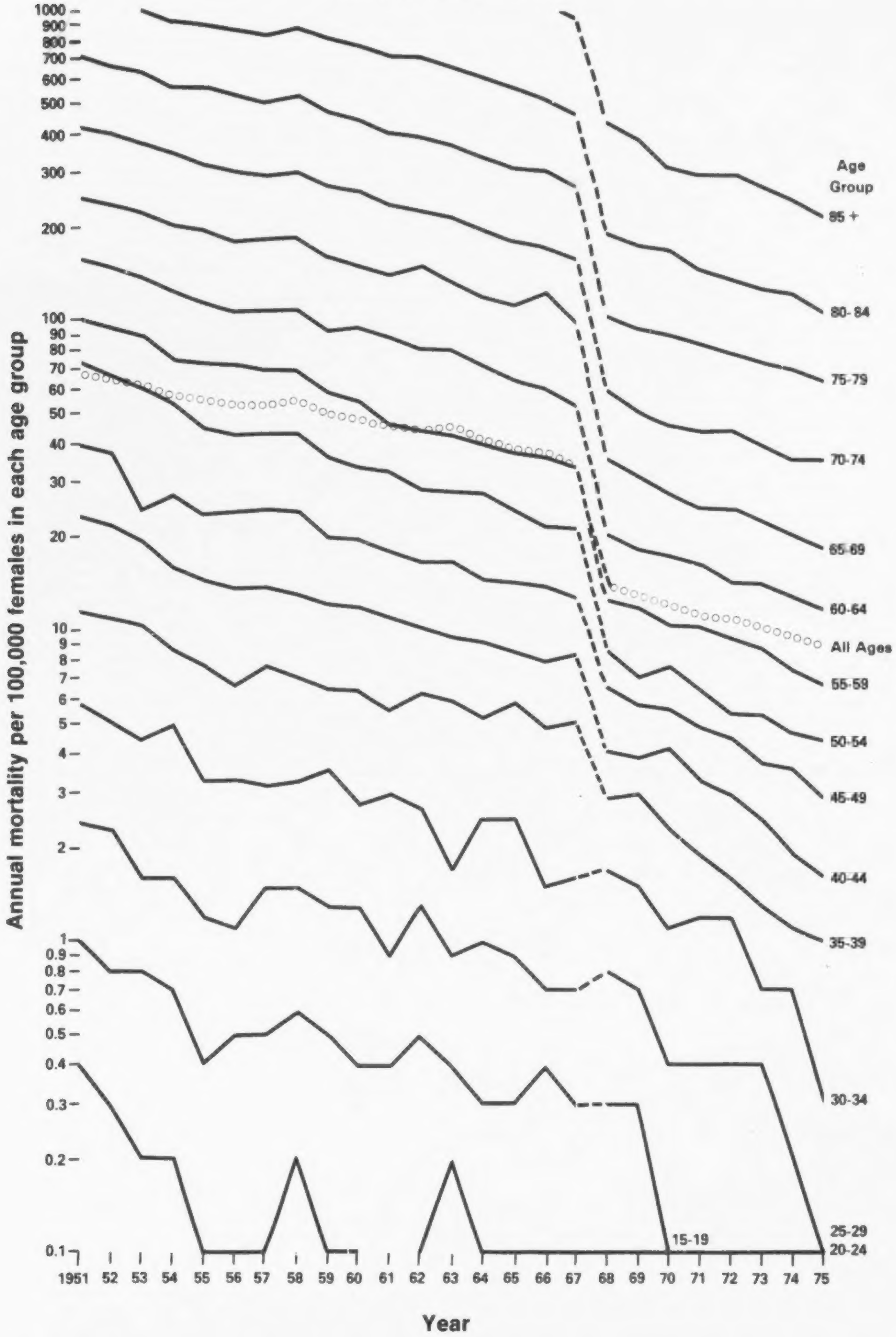


Mortality rates for all circulatory system diseases declined rapidly for US females of all ages during the 1950s, leveled off somewhat for females of reproductive age during most of the 1960s, and decreased rapidly for females of all ages during 1968–1975.

*ICD 390–458 (1968–1975); ICD 330–334, 400–468 (1951–1967)

Source: Ravenholt and Rinehart (155) based on data from US National Center for Health Statistics (207)

Figure 6. Mortality from Hypertensive Disease,* Females, Aged 15 and Older, by 5-Year Age Groups, USA, 1951–1975

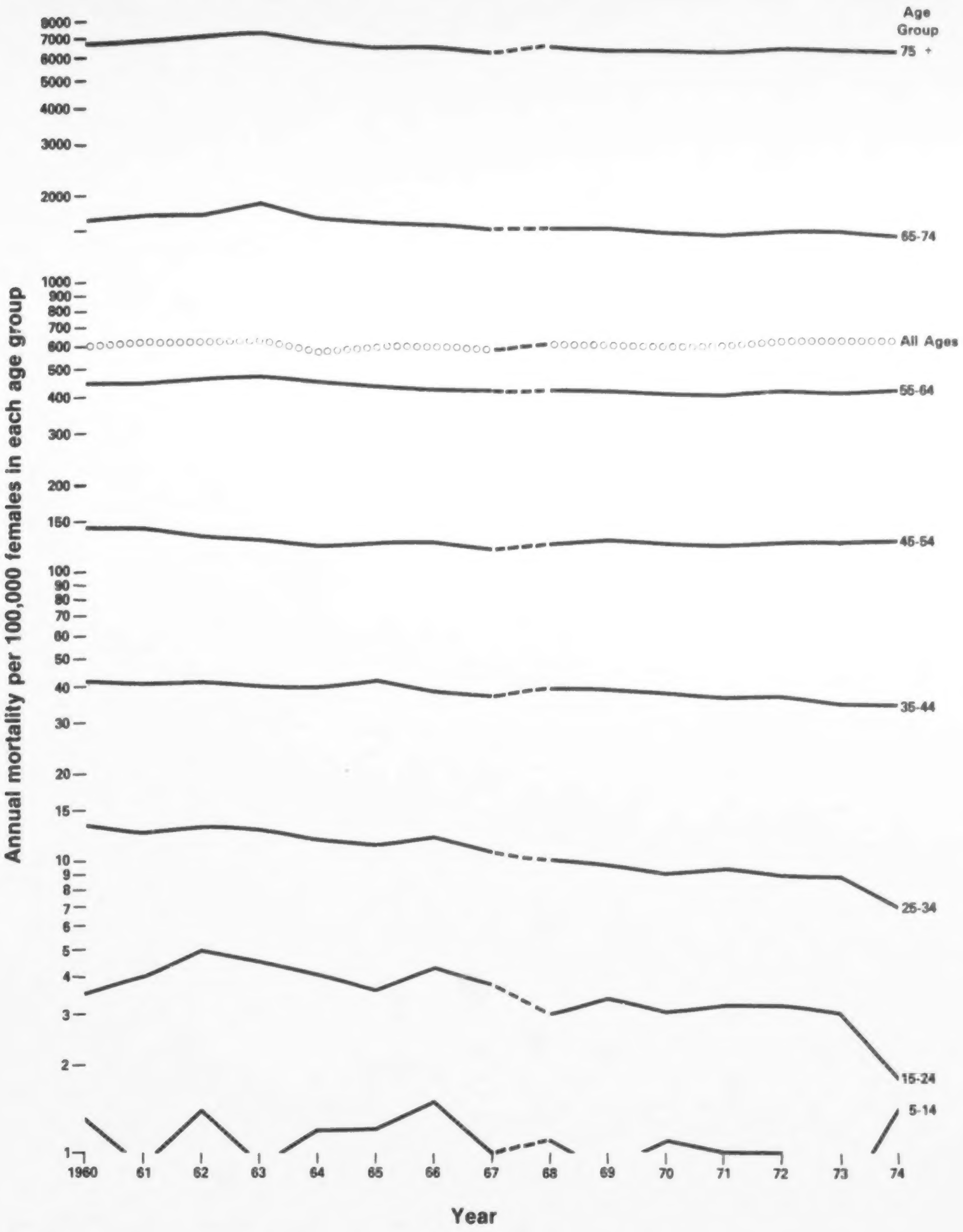


Mortality rates for hypertensive disease decreased dramatically for females of all ages during the last 25 years—especially during the 1970s for those of reproductive age.

*ICD 400–404 (1968–1975); ICD 440–448 (1951–1967)

Source: Ravenholt and Rinehart (155) based on data from US National Center for Health Statistics (207)

Figure 7. Mortality from All Circulatory System Diseases,* Females, Aged 15 and Older, by 10-Year Age Groups, England and Wales, 1960-1974

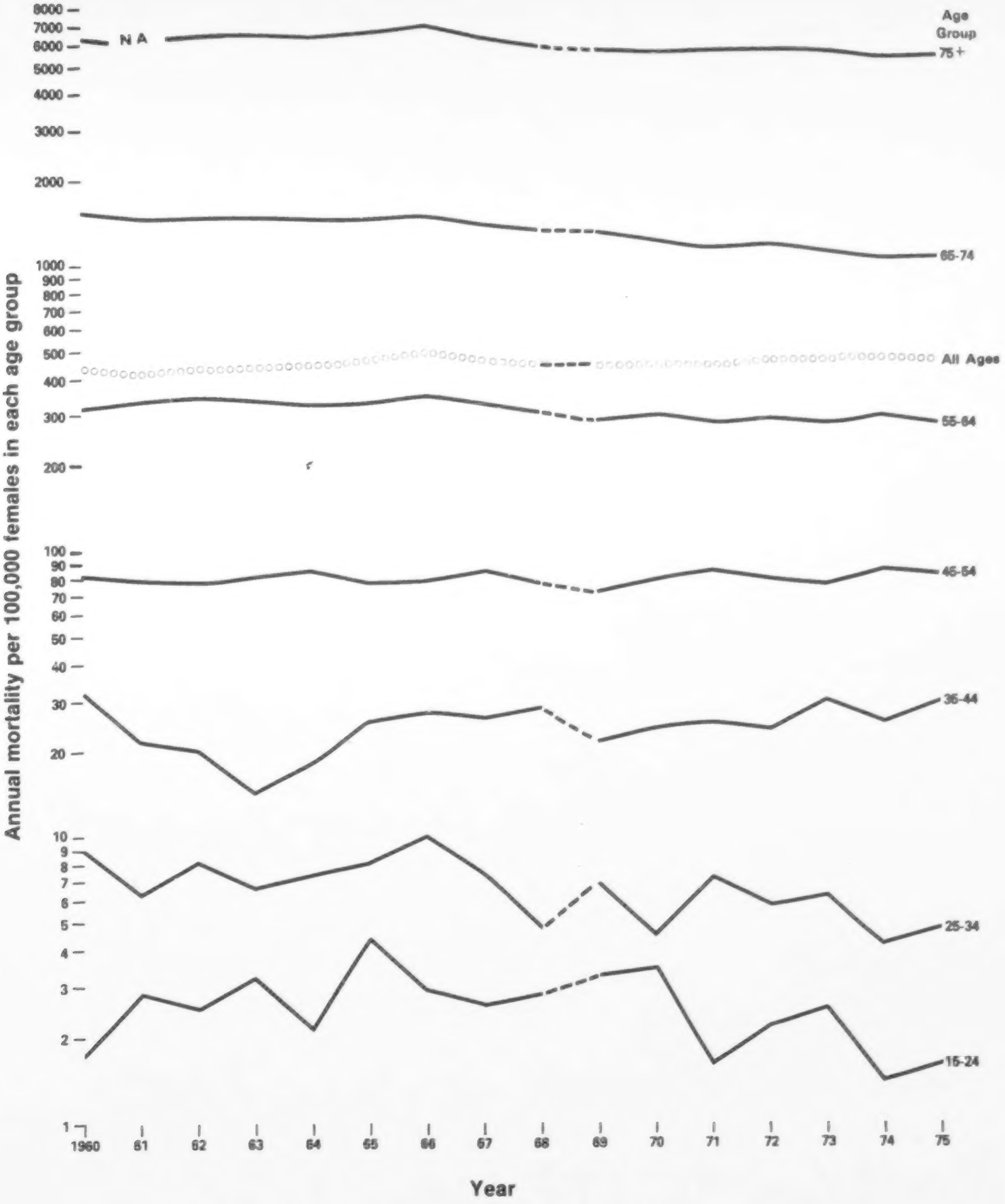


Mortality rates for all circulatory system diseases remained steady for females over age 44 in England and Wales but declined for females of reproductive age.

*ICD 390-458 (1968-1974); ICD 330-334, 400-468 (1960-1967)

Source: Ravenholt and Rinehart (155) based on data from WHO (202)

Figure 8. Mortality from All Circulatory System Diseases,* Females, Aged 15 and Older, by 10-Year Age Groups, Denmark, 1960-1975

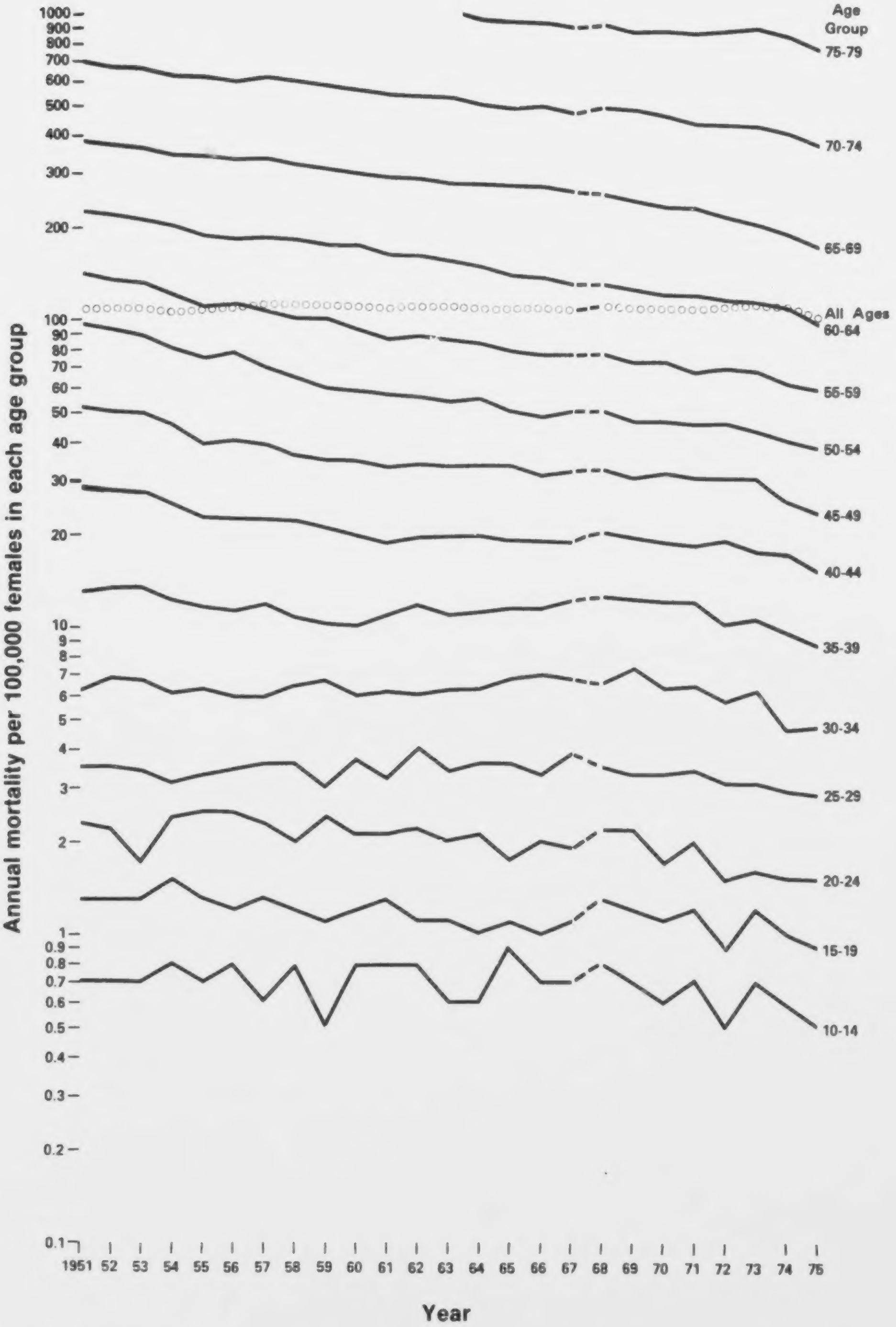


Mortality rates for all circulatory system diseases changed little in Denmark from 1960 to 1975, except that during the last decade rates decreased for females aged 15-34.

*ICD 390-458 (1969-1975); ICD 330-334, 400-468 (1960-1968)

Source: Ravenholt and Rinehart (155) based on data from WHO (202)

Figure 9. Mortality from Cerebrovascular Disease,* Females, Aged 10-79, by 5-Year Age Groups, USA, 1951-1975

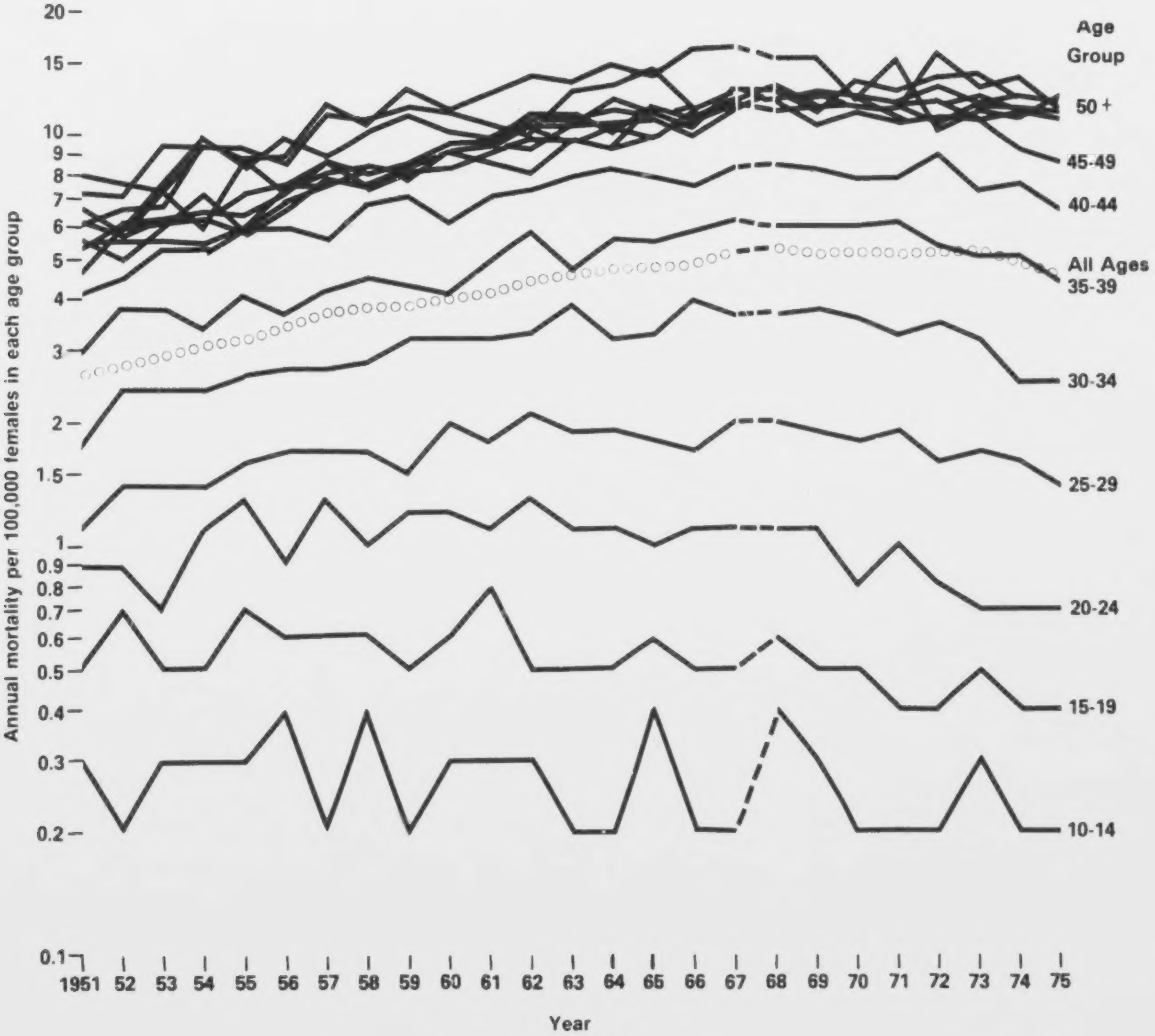


Mortality rates for cerebrovascular disease decreased steadily for females over age 49 from 1951 to 1975, whereas for females of reproductive age the trends leveled off during the 1960s, then resumed the decrease during the 1970s.

*ICD 430-438 (1968-1975); ICD 330-334 (1951-1967)

Source: Ravenholt and Rinehart (155) based on data from US National Center for Health Statistics (207)

Figure 10. Mortality from Subarachnoid Hemorrhage,* Females, Aged 10 and Older, by 5-Year Age Groups, USA, 1951–1975

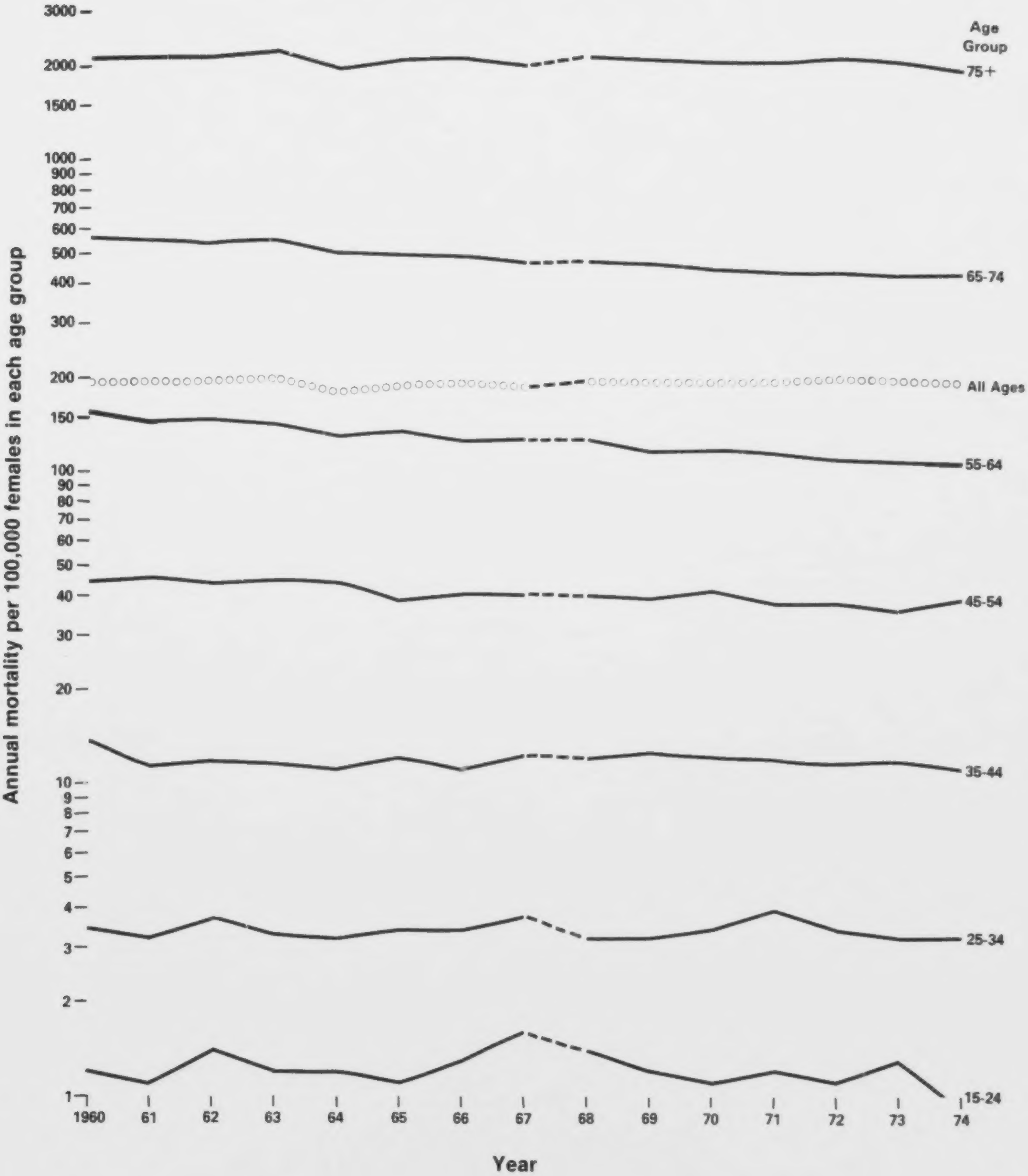


Mortality rates for subarachnoid hemorrhage increased for females over age 24 during the 1960s but have decreased since 1969 for those under age 50.

*ICD 430 (1968–1975); ICD 330 (1951–1967)

Source: Ravenholt and Rinehart (155) based on data from US National Center for Health Statistics (207)

Figure 11. Mortality from Cerebrovascular Disease,* Females, Aged 15 and Older, by 10-Year Age Groups, England and Wales, 1960-1974

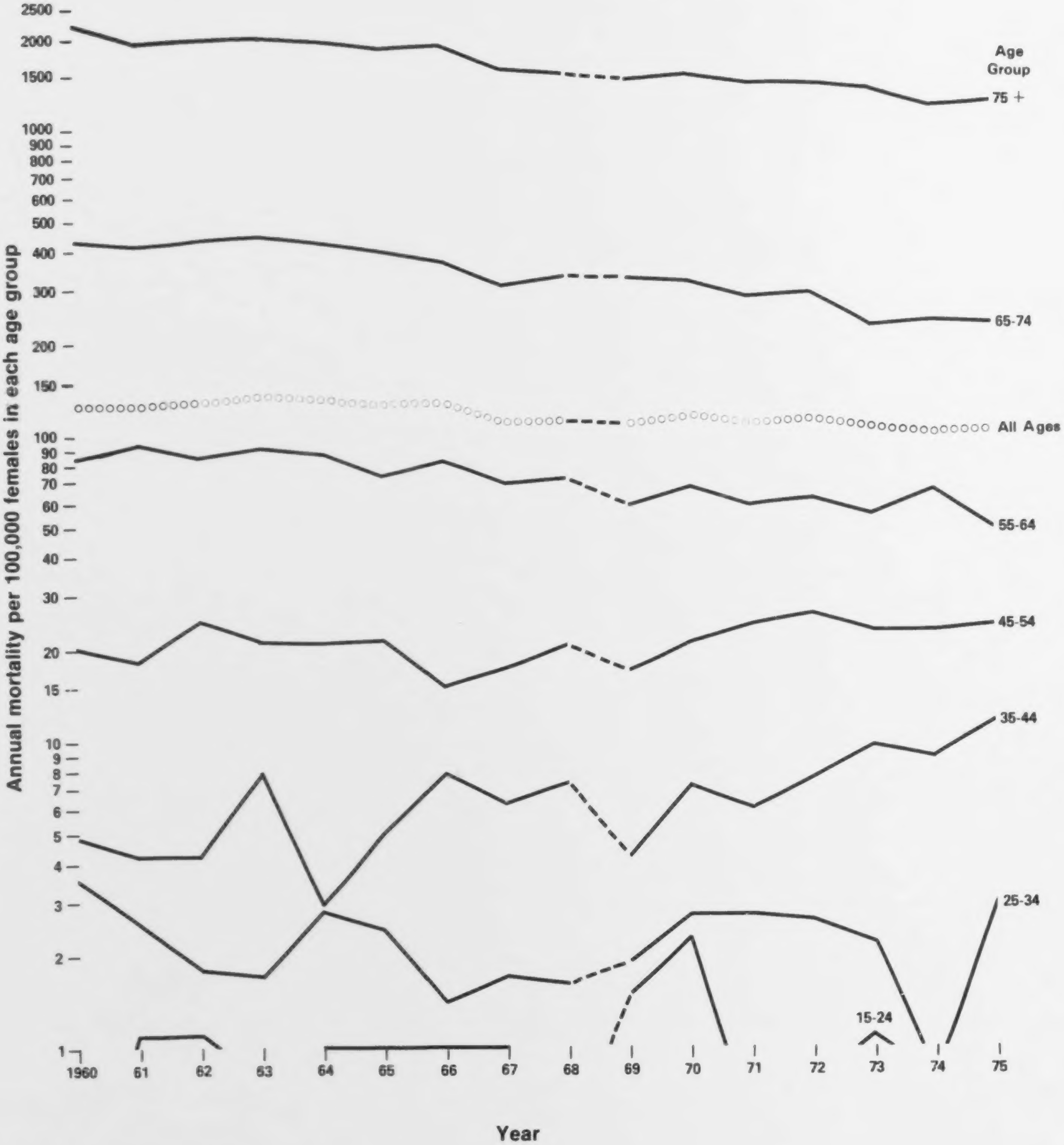


Mortality rates for cerebrovascular disease remained steady for females of reproductive age in England and Wales, while slight declines are evident in the 55-74 age groups.

*ICD 430-438 (1968-1974); ICD 330-334 (1960-1967)

Source: Ravenholt and Rinehart (155) based on data from WHO (202)

Figure 12. Mortality from Cerebrovascular Disease,* Females, Aged 15 and Older, by 10-Year Age Groups, Denmark, 1960–1975



Mortality rates for cerebrovascular disease for females over age 54 have generally decreased, but for females aged 35–54 an increase occurred during the last decade.

*ICD 430–438 (1969–1975); ICD 330–334 (1960–1968)

Source: Ravenholt and Rinehart (155) based on data from US National Center for Health Statistics (207)

1968—perhaps due to reduced fertility—while rates for men remained constant (34).

While analysis of vital statistics trends can be hindered by the quality of the data and the difficulty of taking into account other relevant trends, the data raise legitimate questions about the applicability of risk estimates from British women to other populations, even those in developed countries like the United States. It is possible that substantially higher risks among specific, relatively small subgroups—for example, women over age 35 who smoke or who have multiple predisposing factors—may affect the results of case-comparison and cohort studies without making a detectable difference in national death rates. Further research on smoking and other characteristics of oral contraceptive users who develop circulatory system diseases, including attention to other factors that might predispose them to such diseases, would be helpful.

A study which found a correlation between vital statistics and OC use data—and, in fact, estimated on that basis a relative risk of death from circulatory system disease similar to that later reported by the Royal College study (169)—was published in 1976 (21). V. Beral compared mortality rates from 21 countries, most of them European, for 1961-1962 and 1971-1972. The percentage change in mortality rates for women aged 15-44 tended to be highest in countries where pill use was highest in 1971-1972. Similar correlations of percentage change in pill use with percentage change in mortality rates could not be found for older women or for men between 1961-1962 and 1971-1972 or for women of reproductive age between the pre-pill years 1955-1956 and 1961-1962.

Recent analysis of mortality and OC use trends in the same 21 countries challenges Beral's conclusions. Researchers M. Belsey, Y. Russell, and K. Kinnear at the World Health Organization compared mortality trends in two periods—first, the period between 1955 and the year in which each country reached one-third of peak OC use and, second, the years of peak use thereafter, usually from the mid- or late-1960s to 1973-1976, depending on the availability of recent data for each country. This reduced the possible impact of the wide annual variations in mortality rates, characteristic of uncommon diseases in small populations, that could affect a comparison of rates in two short, separate periods. Also, they divided the populations into three ten-year age groups (19).

The analysis failed to show an association between trends in total cardiovascular disease mortality rates and the level of use of oral contraceptive hormonal steroids in age groups 15-24 and 25-34. On the other hand, in age group 35-44 it showed an improvement in mortality trends in association with oral contraceptive use; that is, the decline in cardiovascular mortality among older women accelerated as pill use increased. Moreover, the countries which did show adverse changes associated with pill use were among those with less than half the median prevalence of pill use for all 21 countries.

The researchers found that for all ages falling mortality from cardiovascular disease was correlated with decreasing per capita consumption of fats and oils, based on UN Food and Agriculture Organization data. In other words, these diet changes had a greater effect on the incidence of cardiovascular disease than did oral contraceptive use. Belsey and colleagues suggest that vital statistics data are "not suitable for testing the association between cardiovascular disease and oral contraceptive use" (19). However, in this case the questions raised by these data deserve further attention and research.

SMOKING, OCS, AND CIRCULATORY SYSTEM DISEASES

Smoking by itself increases the risk of many circulatory system diseases for all women, regardless of their contraceptive method (11, 41, 85, 94, 118, 133). Moreover, the risk rises with the number of cigarettes smoked daily. Thus the woman using oral contraceptives might in any case want to avoid adding to her risk by smoking. More importantly, however, smoking and oral contraceptives together have a synergistic effect on the occurrence of some circulatory system diseases, that is, an effect greater than the sum of their two separate effects. Heart attack and hemorrhagic stroke, particularly subarachnoid hemorrhage, show the synergistic effect most clearly.

The first evidence for the importance of smoking in circulatory system diseases in OC users came from a late 1960s British case-comparison study of thromboembolic disease (211, 212), as reanalyzed by H. Frederiksen and R.T. Ravenholt (61, 62). Frederiksen and Ravenholt pointed out that the relative incidence of thromboembolism was almost 23 times higher in OC users who smoked heavily than in those who neither smoked nor used OCs, while it was about seven times higher in OC users who did not smoke (62) (see Table 19). Subsequent research has associated smoking and venous thromboembolism (145) but has not confirmed a synergistic effect of smoking and OC use on the occurrence of the disease (107, 145, 170).

In circulatory system disease generally, the crucial role of smoking is clear in the Royal College study (169). The death rate for women who both smoked and used OCs was three to four times greater than for nonsmoking OC users or smokers who did not use OCs (see Table 20). Among smokers, the difference in mortality rates between OC users and nonusers was statistically significant ($p<0.01$). Among nonsmokers, a difference was observed but, with only seven deaths among nonsmokers, it lacked statistical significance. In the Oxford/FPA study, seven of the nine OC users who died of cardiovascular disease were smokers (215).

Table 19. Relative Incidence Rates of Thromboembolism, by History of Cigarette Smoking and Use of Oral Contraception, in a British Case-Comparison Study, as Reanalyzed by Frederiksen and Ravenholt, 1970

OC/Smoking Status	Relative Incidence Rate
No smoking, no OCs	1
Smoking 15+ cigarettes a day, no OCs	1.5 × 1
OCs, no smoking	7.2 × 1
OCs, smoking 15+ cigarettes a day	22.7 × 1

Source: Frederiksen and Ravenholt (62)

Since the data released from these studies so far do not divide the women who smoked either by age or by their status as past or ever smokers or as light or heavy smokers, it is possible that the overall impact of smoking is even greater than currently available figures suggest.

The recent Walnut Creek study of subarachnoid hemorrhage found a strong relationship between smoking and this type of stroke and also a dramatic synergism of smoking and oral contraceptive use. Regardless of their contraceptive status, women hospitalized for subarachnoid hemorrhage had a relative risk of smoking at entry into the study of 5.7. For OC users, the relative risk was 6.5. But for smokers who also used OCs, the relative risk was 21.9. In fact, there were only 3 nonsmokers among the 11 cases—too few to study separately (144).

An earlier study of 196 hemorrhagic strokes in US women showed greater hazards for smokers than for OC users and some evidence of synergism. For nonsmokers, the increase in risk associated with pill use was very slight—20 percent—and not statistically significant. On the other hand, smoking, in the absence of OC use, approximately doubled the risk of hemorrhagic stroke. But for OC users who smoked a pack of cigarettes or more a day, the relative risk jumped to 6.1 or 7.6 compared with that of similar smokers in two control groups. Synergism of OC use and smoking was not observed for thrombotic stroke, nor was smoking a risk factor independently (41).

Table 20. Rates of Mortality from Nonrheumatic Circulatory System Diseases in the Royal College of General Practitioners' Cohort Study

OC/smoking status*	Deaths/100,000 woman-years**
No smoking, no OCs	3.0 (2 deaths)
Smoking, no OCs	8.9 (3 deaths)
OCs, no smoking	13.8 (5 deaths)
OCs and smoking	39.5 (19 deaths)

*Smoking status—at date of admission to study; OC status—at any time during study.

**Rates standardized for age at entry, social class, and parity.

Source: Royal College of General Practitioners' Oral Contraception Study (169)

Data on heart attack from British and US case-comparison studies reveal a powerful synergism of smoking and oral contraceptive use at work in the occurrence of this disease, too. The effect is so strong that it led one group of US researchers to conclude that ". . . acute MI [myocardial infarction] in otherwise healthy premenopausal women is almost exclusively an illness of cigarette smokers" (94). As reanalyzed by H.W. Ory (135), the data from Britain (118) show that nonsmokers who have used OCs approximately doubled their risk of heart attack, but the difference was not statistically significant; there were only 16 cases of heart attack in women who had never smoked, compared with 41 cases in current smokers. Adding smoking to OC use, however, multiplied the danger fivefold, to a relative risk of 11. Smoking cigarettes heavily—25 or more a day—was more likely to lead to heart attack than was oral contraceptive use (135).

Table 21. Estimated Annual Mortality Rate per 100,000 Women from Myocardial Infarction, by Use of Oral Contraceptives, Smoking Habits, and Age

Smoking Habit	Women aged 30–39		Women aged 40–44	
	OC Users	Nonusers	OC Users	Nonusers
All Smokers	10.2	2.6	62.0	15.9
Heavy	13.0	5.1	78.7	31.3
Light	4.7	0.9	28.6	5.7
Nonsmokers	1.8	1.2	10.7	7.4

Source: Jain (89)

Using data from the British studies, A.K. Jain has estimated annual mortality from heart attack in OC users and nonusers according to their smoking habits and age. The effects of the combination of age, smoking, and OC use are clear (89) (see Table 21).

A recent US study of 26 nonfatal heart attack cases and 59 controls found the same synergism of smoking and OC use. OC use alone and smoking alone had virtually no effect on risk of heart attack, but smoking and OC use together produced a relative risk of almost 31 (see Table 22). Only two of the 26 cases were nonsmokers. The researchers estimated the risks to nonsmokers to be "extremely small" (94).

Young women likely to suffer heart attacks are also likely to have high cholesterol levels in the blood, hypertension, a history of preeclamptic toxemia during pregnancy, a tendency to obesity and/or to be smokers (118). These are generally recognized risk factors for myocardial infarction. Ory points out that only 1 of 58 survivors of heart attack studied by J.I. Mann and colleagues used OCs and had no other risk factors. Thus the risk estimates derived from the study apply only to OC users with at least one other risk factor (135). For these women, who, according to Mann and colleagues' data, may constitute one-third of the women of reproductive age in a developed country (118), OC use may multiply their risk of heart attack—already greater than for women without other risk factors—by 2.8 (135).

The biochemical mechanisms by which smoking and oral contraceptive use interact are not yet known. Recent work shows that smoking lowers HDL cholesterol levels, with

Table 22. Smoking and Oral Contraceptive Use in a US Case-Comparison Study of Myocardial Infarction

OC/Smoking Status*	Number (Percentage)		Relative Risk
	Cases	Controls	
No smoking, no OCs	—	28 (47)	—
OCs, no smoking	2 (8)	10 (17)	0.4
Smoking, no OCs	6 (23)	17 (29)	0.7
OCs and smoking	18 (69)	4 (7)	30.9
Total	26 (100)	59 (100)	

*Smoking—at time of hospital admission; OC use—within three months before hospital admission.

Source: Jick et al. (94)

lower levels for heavier smoking, thus perhaps raising the risk of heart attack (10, 30). The effects of OCs and smoking appear to be additive rather than multiplicative. As the researchers point out, this does not rule out a synergistic effect on disease incidence, because heart attack risk may not be linearly related to HDL cholesterol level (30).

Further research may help explain the synergistic action of smoking and oral contraceptives, better identify the diseases involved, and better quantify the risks of the two factors separately and in combination. It is clear already, however, that the risks of heart attack and subarachnoid hemorrhage for healthy young OC users who do not smoke or have no other factors predisposing them to cardiovascular disease are very slight.

In Developing Countries

Applying the findings of US and British epidemiologic studies directly to women in developing countries may not be justified. The women of developing countries differ from the women of industrialized nations in diet, lifestyle, genetic heritage, exposure to disease vectors and environmental contaminants, smoking habits, and myriad other ways that seem to affect cardiovascular disease. Furthermore, not enough research has been done in developing countries to justify a conclusion that the risk factors for cardiovascular diseases that have been identified in the industrialized nations are important elsewhere. Indeed, some have observed that they are not. For example, A.G. Shaper notes that:

> It is the experience of the vast majority of clinicians and pathologists working in the tropics that even the obese, sedentary, severely hypertensive, long-standing diabetic does not (except with the rarest of exceptions) develop coronary heart disease, even in soft-water areas (183).

Furthermore, it is widely recognized that in developing countries (1) the incidence of circulatory system diseases is low, with the possible exception of hypertension, and (2) many "Western" risk factors are far less prevalent. This double advantage would mean that, even if US and British risk ratios could be applied to developing country women, the incidence of circulatory system disease attributable to OCs would be very slight.

While a few areas are exceptions, heart attack is uncommon in developing countries (183, 184, 195, 210). Venous thromboembolic disease also appears to be rare (37, 38, 193, 195). Hypertension seems to be less common in traditional societies (210, 219). In some groups blood pressure does not rise with age and high blood pressure is almost nonexistent (139, 182, 219). Blood pressure tends to be higher in urban than in rural areas and to rise in those who move from the country to the city (125, 182, 219).

Smoking among women is, generally, a practice of the developed countries. National per capita tobacco consumption corresponds to per capita income (140), and in the developing countries women usually comprise a much smaller portion of smokers and of those who smoke heavily than they do in the developed countries. A sampling of data from around the world discloses these percentages of women smoking: 4–6 percent in Guyana (12, 122), 1.6 percent in Sri Lanka (209), 3.6 and 7.8 percent in two ethnic groups in Natal (179), 13.9 percent in Jamaica (122), and, in Latin American cities, from 7 percent in Lima to 26 percent in Santiago (96). This compares with 30 to 50 percent in the US and Britain (122, 167, 208). Thus whatever effect smoking may have on the health of OC users in developing countries, it would be a much smaller public health problem than in the developed countries.

Assuming that the US and British risk factors for heart attack of smoking, high cholesterol levels, and hypertension apply in developing countries, J. Heiby has used data from British studies (114, 134, 214) to estimate the risk of heart attack for women in traditional societies. Like smoking among women, hypercholesterolemia is relatively rare in traditional societies (12, 113, 137, 139, 180), while hypertension rates Heiby assumed to be similar. Heiby calculated, then, that the proportion of women in a traditional society with one of these risk factors would be 30 percent that of British women; with two risk factors, 9 percent; with three risk factors, 1.5 percent. Overall, the mortality rate—presuming equal survival rates for heart attack cases—would be 19 percent of the British rate, or roughly four heart attack deaths annually per one million OC users. Screening out tobacco users, Heiby estimated, would reduce the rate to three per million (74).

Heiby's estimate deals only with heart attack risk. Given the need to rely on crude assumptions about the role of risk factors and sparse data on their prevalence, it is a rough estimate, not applicable to any specific country or group of women. Nonetheless, it suggests the considerably lower risk of circulatory system disease in women, including those who use oral contraceptives, in developing countries compared with women in developed countries. Only actual research in developing countries will determine whether the risks exist there and to what extent.

NEOPLASIA

When, in May 1977, research on oral contraceptives and neoplasia was reviewed in **Population Reports** A-4 and Supplement, there was no clear evidence that combined oral contraceptives cause cancer. Substantial evidence did exist, however, that users of oral contraceptives develop benign breast neoplasia less frequently than do nonusers, and that they develop a rare, benign, although sometimes life-threatening, liver tumor more often than do nonusers. Findings reported in the last 18 months have not altered those conclusions.

Biologically, the relationship between steroidal contraceptives and malignant disease, especially cancer of the breast and reproductive system, must rank as the single most important concern in relation to long-term use of oral contraceptives. The development and course of several tumors of the reproductive system are modified by the level of circulating hormones. The relationship is a complicated one, and different hormones in different concentrations can have either an adverse effect, a beneficial effect, or no effect whatsoever, depending on the type of tumor, the organ involved, and the woman's reproductive history.

In the USA about one-quarter of all women die of cancer and one-quarter of those die of breast cancer. The disease kills one in 20 women in Britain and one in 18 in the USA, where it is the largest single cause of death among women aged 40–44 (6). It is common in nearly all developed countries but less common in developing countries. Breast cancer is so common in industrialized nations, in fact, that any change in frequency which might be induced by steroidal contraceptives would be profoundly significant. Fortunately, after two decades of extensive OC use, the evidence, including a study published since the last survey in **Population Reports**, weighs against an association of OCs with breast cancer.

In recent studies the protective effect of OCs against benign breast disease has been confirmed and better defined. New information on cervical lesions has raised suspicions somewhat but is ambiguous. A single small study has suggested that OC users may be less likely to develop ovarian cancer than are nonusers, while another, also unconfirmed, investigates links between OC use and melanoma.

Breast Cancer

In the Royal College study, 14 of the women who had ever used orals died of cancer compared with 20 of the never users. Among the OC users, cancers of the reproductive system included three breast cancers and one cancer of the cervix; among the never users, or controls, there were six deaths from breast cancer, three from cancer of the ovary, and one from cancer of the vulva. In the Oxford study 12 women using diaphragms or IUDs died of cancer compared with 10 OC users. (See Table 11.) In neither study were the differences statistically significant, however, and women with a previous history of breast disease may have been encouraged not to use orals. Nevertheless, the lower number of cancer deaths among OC users is reassuring.

Although the neoplasia deaths are not discussed in the brief 1977 reports, an earlier article by M. Vessey and colleagues (213) on morbidity in the Oxford/FPA group reported that OC users were about half as likely to develop cancer as diaphragm and IUD users and also about half as likely to develop breast cancer specifically, although the number of women suffering from breast cancer was too small to calculate a statistically significant difference.

Like most earlier studies (see **Population Reports** A–4), the only epidemiologic study specifically on breast cancer and oral contraceptive use to appear in the last 18 months found no association between the two (99). J.L. Kelsey and colleagues, looking at 99 cases of cancer and an equal number of matched controls, found 23 pairs in which the case used OCs but the control did not and 17 pairs where the situation was reversed. After adjustment for other possibly relevant differences between cases and controls, the relative risk of OC use was estimated to be 1.6, not a statistically significant difference. Evidence against a cause-and-effect association included the lack of any relationships of cancer to duration of OC use, to age at first use, or to length of time since first use. Also, Kelsey and colleagues found no evidence to support the findings of an earlier California study that risk of developing breast cancer was increased for OC users who had taken the pill for more than two but less than four years or who had had benign breast disease (53, 138). The number of cases examined in the recent study was not as large as in the earlier one, however. Not tested was the earlier study's finding of more OC use among cases who used the pill before the birth of their first child than among their controls.

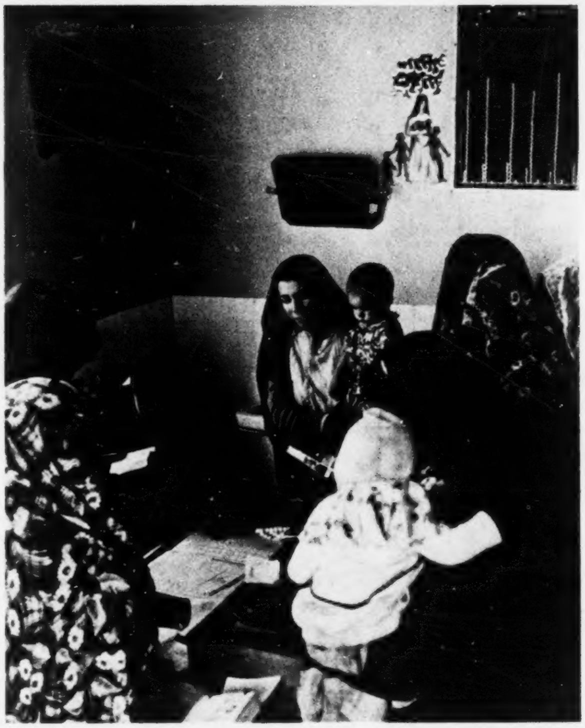


Figure 13. A particular feature of the distribution of pills at the Shiraz Family Center of Iran is the reclaiming of used wrappings before new supplies are provided. (WHO/Zeppilli)

Corollary evidence against a role of oral contraceptives in breast cancer comes from a recent study of breast cancer tissue from 44 OC users and from an equal number of nonusers of similar age and parity (188). Researchers could find no differences between the two groups in the histological features of the tissue or in the extent to which the malignancy had spread to axillary lymph nodes. In fact, cancer recurred significantly more often in nonusers with axillary lymph node involvement than in OCs users whose disease had reached a similar stage. An observation like this underscores the comment that, despite extensive research, the role of hormones in breast cancer is still far from clear (100).

Benign Breast Disease

The protective effect of oral contraceptives against benign breast neoplasia is the clearest of relationships between OCs and neoplastic diseases. Recent months have added two more studies to those affirming this beneficial association (see **Population Reports** A–4).

J.L. Kelsey and colleagues found that women with the two most common types of benign breast neoplasia, cystic hyperplasia (n=209) and fibroadenoma (n=120), had used oral contraceptives for shorter periods of time than their individually matched controls. This confirmed earlier studies. Four years or more of OC use halved the risk of developing benign breast disease. Unexpectedly, further analysis showed that only sequential oral contraceptives—and not the more widely used combined type—seemed to manifest this protective effect. An effect limited to sequentials had not been suggested by previous studies (99).

A Boston (USA) study based on questionnaires completed by 65,843 women in 1970 showed that hospitalizations for benign breast disease in 1969 decreased with the duration of OC use. Hospitalization rates for women with 1–15 months of OC use were similar to those for never users, but for over 15 months of use showed a clear reduction in rate. Among nonusers, the rate was 5.4 per 1,000 women per year; for 1–9 months of OC use, 6.4; for 10–15 months, 6.0; for 16–39 months, 3.1; and for more than 39 months, 3.1 (79).

Women who develop benign breast disease have a propensity to develop breast cancer later. But in OC users no protective effect against breast cancer, comparable to the effect against benign disease, has yet been observed. Tissue studies conducted at Yale University in conjunction with the epidemiologic study of breast neoplasia by Kelsey and colleagues suggest an explanation for this paradox (110). Examining tissue samples from fibrocystic breast tumors in 205 women, V. LiVolsi and colleagues found that OC use was associated with a smaller number only of benign tumors in which there was little or no atypical ductal epithelial cell development. The greater the degree of atypical epithelial cell development, previous research on fibrocystic disease has shown, the greater the chance that cancer will follow. The researchers suspect that fibrocystic diseases with varying degrees of atypia are different stages of the same disease. If so, more needs to be learned about what influences progression from one stage to another before the role of the pill can be thoroughly explained.

Ovarian Cancer

A recent case-comparison study from Britain suggests that oral contraceptives may protect their users against ovarian cancer. The number of OC users in the study was small, however, and potential confounding factors were not taken into account. In all, 300 cases of ovarian cancer were compared with two sets of controls individually matched for age—one set consisting of women in hospitals for gynecological complaints other than ovarian tumors or cysts; the other, women from the same neighborhoods as the cases. Only 19 of the cases, compared with 31 of each of the control groups, had used oral contraceptives. Compared with the hospital controls, the relative risk of previous pill use among the cases was 0.59; compared with the neighborhood controls, 0.33, the latter being statistically significant ($p < 0.05$) (128). The study is the first on ovarian cancer and OCs, and its findings are an impetus to further inquiry. In the Royal College mortality study there were three deaths from ovarian cancer among the never users but none among the users (169); in the Oxford/FPA study, one OC user and one IUD user developed ovarian cancer (213). An association of rising rates of ovarian cancer with declining parity (22), coupled with the case-comparison report on OCs, suggests that interruption of ovulation may reduce the risk of ovarian cancer.

Cervical Neoplasia

Age at first intercourse and the number of sexual contacts are key determinants of the occurrence of cancer of the cervix (16, 120, 165). The only study to analyze thoroughly the relationship among OCs, sexual behavior, and cervical malignancy—the Walnut Creek study—is now finding that sexual behavior accounts for some but not all of the apparently higher risk of cervical neoplasia among OC users.

The Walnut Creek researchers found initially that the incidence of cervical carcinoma in situ, but not of dysplasia, thought to be its sometimes reversible precursor, was related to duration of oral contraceptive use. Their analysis was based on 35 cases of carcinoma in situ and 31 of dysplasia found among the 14,567 women in the Walnut Creek study population (143). Subsequently, when account was taken of early sexual activity and number of partners, the difference in risk between users and nonusers diminished, losing its statistical significance, and the association with duration of use was weakened (148, 201). Additional data from the Walnut Creek study will be published soon.

J.G. Boyce and colleagues in New York City looked at 689 women with cervical carcinoma in situ and an equal number of controls without the disease, matched for several variables, including age at first coitus. Similar proportions of the case and control groups had used oral contraceptives, and no differences between the groups appeared with regard to duration of use, estrogen dose, or the year in which OCs were used (28).

Other recent reports have not analyzed differences in sexual behavior. Their results vary. The Oxford/FPA study reported virtually equal rates of carcinoma in situ developing in OC and IUD users—0.45 and 0.43 per 1,000 women-years respectively—but no cases occurred in diaphragm users, suggesting a protective effect of this barrier method of contraception (213). The Boston mail survey found that OC users were hospitalized for cancer of the cervix five times more often than nonusers in 1969 but only 1.8 times more often in 1970–1972. The researchers suggested that the higher rates for OC users might be due to doctors' tendency to recommend hospitalization more frequently for OC users generally (79).

A mass screening of women in the Netherlands disclosed no statistically significant difference in the prevalence of cervical malignancy between OC users and nonusers. After adjustment for age differences, OC users were 1.2 times more likely to have cervical carcinoma or invasive cancer than were nonusers (42) (see Table 23).

A long-term study of US women with dysplasia, some of whom had chosen the pill, some, other methods of contraception, has suggested that dysplasia was more likely to progress to carcinoma in situ in the pill users (191). The difference appeared only after more than five years of followup and became statistically significant after more

Table 23. Prevalence (and Crude Prevalence Rate per 1,000 Women) of Cervical Malignancy in a Netherlands Cervical Cytology Screening Program, 1970–1973

	OC Users	Nonusers
Number screened	9,023	19,500
Ca in situ*	33 (5.8)	73 (3.7)
Invasive ca*	7 (0.8)	25 (1.3)
All carcinomas of cervix	40 (4.4)	98 (5.0)

*Histological diagnosis

Source: Collette et al. (42)

than six years. The numbers involved are small due to a high dropout rate. Looking at the data another way, researchers observed that an index of the severity of dysplasia, averaged for each group, declined for nonusers over a 4-year period but stayed approximately the same for users. In contrast to these findings, a sample of 300 women with normal cervical cytology, chosen from the same population of clients of Los Angeles family planning clinics, has showed no differences related to contraceptive method in the development of atypical cytology. Together these findings could be interpreted as reflecting a role for oral contraceptives in promoting but not initiating cervical neoplasia, but more research will be needed before conclusions can be reached.

Liver Tumors

A rare type of benign liver tumor, known as hepatocellular adenoma or liver cell adenoma, is associated with long-term OC use, especially in older women (9, 55, 103; see also **Population Reports** A-4, p. A88-A90). The actual incidence of the tumor is unknown; 500 cases have been reported in the USA, not all of them in pill users (9). A recent case-comparison study shows that the effect of duration of use on the risk of developing hepatocellular adenoma is marked. When compared with women who had used OCs for one year or less, 4-year users faced nine times the risk; 4-7 year users, 120 times the risk, and 8-year or longer users, 500 times the risk (9). While the relative risk is dramatic, the rarity of the disease keeps its incidence in pill users low. A WHO Scientific Group studying oral contraceptives and neoplasia estimated the increase in incidence attributable to oral contraceptives to be no more than 3 per 100,000 women per year for those under age 30 and some unknown figure "certainly greater than 3 per 100,000" for older women (201). Hepatocellular adenomas seem to be most closely associated with the high-dose OCs, which have been used less frequently in recent years (9).

Most cases of hepatocellular adenoma are detected when a patient complains of pain in the abdomen and of feeling a mass in the upper right quadrant. These tumors can rupture, causing bleeding into the peritoneum, which in turn produces acute pain and leads to circulatory collapse and sometimes death (162). The usual treatment for adenomas is resection (55). In some cases, however, withdrawal of OCs has led to regression of the tumor (47, 151).

Melanoma

Researchers at Walnut Creek found that melanoma occurred slightly more frequently in users of oral contraceptives than in nonusers. Their findings were not statistically significant, and they could not rule out the possibility that their results were due to differences in exposure to the sun rather than to oral contraceptive use. In about 90,000 woman-years of observation of the nearly 18,000 participants in the study, 22 cases of malignant melanoma were diagnosed. Adjusted for age differences, the number of cases per 100,000 woman-years was 17.6 for women aged 25-54 who had never used OCs (five cases), 24.1 for women who had used OCs for less than four years (eight cases), and 29.5 for women who had used the pill for longer periods (six cases). (Three women had used estrogens other than oral contraceptives.) Considered by ten-year age groups, similar trends appeared in the oldest and youngest groups but not in the 35-44 age group. The number of cases is small and none of these differences is statistically significant. The same researchers conducted a case-comparison study as well, using 37 other cases and twice as many controls. Their estimate of relative risk was 1.8, not statistically significant (24).

Endocrine factors appear to be involved in melanoma in some way (59, 174), but a major risk factor apparently is exposure to sunlight (54). This was not taken into account in the Walnut Creek study. Another case-comparison study of the issue now beginning in California will look at a variety of possible risk factors in addition to oral contraceptive use.

OTHER CONDITIONS

Since the summary of oral contraceptive research in **Population Reports** A-2 of March 1975, information emerging from many different studies—the ongoing cohort studies and specific case-comparison and laboratory studies—has revealed little outside the realm of circulatory system disease that substantially changes previous assessments of oral contraceptive safety and benefits. Among long-standing concerns about oral contraceptives have been questions about the return of fecundity after their use and about congenital malformations in offspring of former OC users. New information from large-scale studies is reassuring on both counts. In contrast to this long-sought information, recent cohort study findings on rheumatoid arthritis and acute hepatitis are unexpected: OC users were diagnosed less frequently than nonusers as having rheumatoid arthritis and more frequently as having hepatitis.

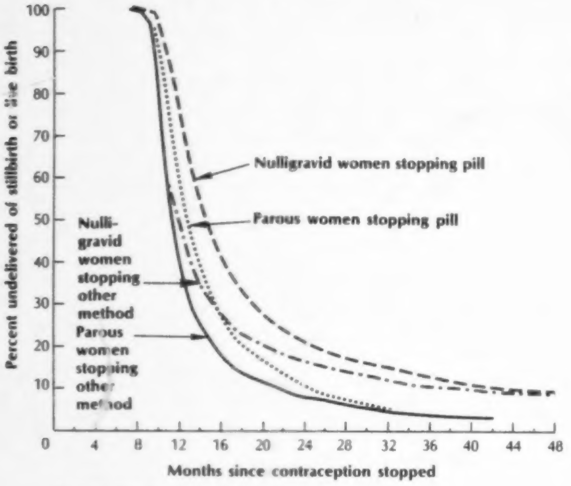
Return of Fecundity

Women who stop taking oral contraceptives to become pregnant can expect to wait a few months longer for conception than former users of IUDs and traditional methods, but there seems to be little risk that oral contraceptive use leads to permanent sterility. The best data come from the Oxford/FPA study and the Jerusalem Perinatal Study. They compare the conception rates over time of large numbers of women—1,174 former pill users and 779 former users of other methods in the Oxford/FPA study, 1,403 pill users and 4,477 users of other methods in the Jerusalem study (73, 218). Both studies found that conception rates among former pill users lagged behind rates among other women for a few months but eventually caught up. In the Jerusalem study the difference disappeared in three months; in the Oxford/FPA study, in 42 months (see Figure 14). Duration of OC use did not appear to affect the length of temporary impairment of fertility in the Oxford study (218). In the Jerusalem study, fertility returned more slowly on the average to older pill users, particularly if they had used the pill for a long time. There was little suppression of fertility in young women, regardless of the length of pill use, or in older, short-term users (73).

Effects On Offspring

Recent large-scale studies have dispelled much of the fear that women who have used oral contraceptives **before** pregnancy might be more likely than nonusers to bear

Figure 14. Fertility after Stopping Different Methods of Contraception in Order to Conceive, Oxford/ Family Planning Association Study



Source: Vessey et al. (218)

infants with congenital malformations. At the same time, while there is still much to be learned, research strongly suggests that women should avoid taking any steroidal hormones **during** pregnancy and should switch to another contraceptive method immediately if they think they might be pregnant.

Both British cohort studies and the Boston area mail survey have found no evidence of any major adverse impact of previous pill use on fetal development (164, 171, 213). These studies involved from over 1,000 to more than 5,000 births to former pill users. In none of them did the overall rate of malformations differ significantly between former pill users and nonusers nor did any specific type of malformation show an association with previous pill use (see Table 24*). No effect—or else a slight beneficial effect—of pill use on rates of miscarriage has been observed in these studies (162, 171, 218).

In general, a study of about 3,000 pill users and over 13,500 nonusers who gave birth in Jerusalem over a two-year period produced similar reassuring results. Congenital malformations as a whole and most major malformations were less frequent among the infants born to women who had used the pill since their previous pregnancy (if any). The former pill users' babies were heavier, partly due to longer intervals between births, and perinatal mortality was generally lower. Rates of previous miscarriage were higher, however. Also, Down's syndrome was more frequent in pill users' offspring, but the number of cases was small—10 in users and 24 in nonusers—and the difference not statistically significant (73). Contrary to the Jerusalem report, a US case-comparison study, involving 103 women whose children had Down's syndrome and an equal number of women of similar age, date of delivery, and area of residence who had normal children, found OC use before pregnancy more common in the mothers of normal children. The difference did not quite reach statistical significance (91).

Two recent case-comparison studies confirm the general findings of cohort studies that there is no link between OC use **before** pregnancy and congenital malformation. In a Connecticut (USA) study, 1,370 cases with congenital malformations were compared with 2,968 normal infants. The cases' mothers were slightly less likely to have used OCs in the year before conception than were the controls'. The difference was not statistically significant. Down's syndrome was not associated with OC use, nor was any other of 16 types of defects (29). Another US study found that OC use in the year before conception was approximately 25 percent both among the mothers of 607 infants with congential malformations and among the mothers of an equal number of normal infants (92).

The information on OC use **during** pregnancy, as opposed to **before** pregnancy, suggests some danger of certain types of malformations. Studies have associated congenital malformations with large doses of hormones given during pregnancy as pregnancy tests or to prevent miscarriage. This has led researchers to look at oral contraceptives specifically, and several small case-comparison studies have associated inadvertent use of OCs during pregnancy with certain types of birth defects—in particular, limb reduction, heart defects, and a syndrome of multiple malformations of vertebrae, anus, heart, trachea, esophagus, kidneys, and limbs (93, 130, 131). On the other hand, hypospadias, a condition which may be due to fetal hormonal disorders and which has been linked to large doses of progestins taken during pregnancy (3), has not been noted particularly in infants exposed in utero to OC hormones.

Two recent reports reinforce earlier findings that heart defects can result from use of hormones during pregnancy, but the proportion of OC users among the hormone users has been small. Six children with cardiovascular defects were born to 278 women who had used OCs during early pregnancy (21.5 per 1,000), compared with 385 in 49,240 births to women who did not (7.8 per 1,000). Although this difference involving OCs is not statistically significant, exposure during pregnancy to female hormones in general was significantly associated with cardiovascular malformations (75) (see Table 24). A case-comparison study of congenital heart disease produced a similar result—a significant difference when all hormones were considered but not for oral contraceptives separately (90).

In the Connecticut case-comparison study, OC use **during** pregnancy was slightly more common in the cases' mothers than in the controls', but not significantly so. For a number of specific malformations, including Down's syndrome and anacephaly, OC use was twice as frequent in cases' mothers as in controls', but again the difference lacked statistical significance (29).

The unexpected findings of the Connecticut study are that (1) heavy smoking (more than 20 cigarettes a day) was significantly more common in the cases' mothers than in the controls', and (2) heavy smoking and oral contraceptive use during pregnancy appeared to act synergistically. The researchers calculated that those who smoked heavily and had used OCs **during** pregnancy faced 13 times the risk of having a child with a congenital malformation that nonsmokers who had not used OCs did. While statistically significant, this estimate has a wide margin of error because the numbers involved are small—six cases and one control had mothers who both had used OCs during pregnancy and smoked heavily.

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*Table 24, which summarizes selected cohort studies of birth defects and oral contraceptive use, appears on p. A-183.

Although an association between congenital defects and the specific use of OCs **during** pregnancy has not been established conclusively (5, 129), avoiding the use of all hormones, including oral contraceptives, seems a reasonable precaution for a pregnant woman.

Rheumatoid Arthritis

Oral contraceptives may protect their users against rheumatoid arthritis. The disease occurred approximately half as frequently in OC users as in nonusers in the Royal College study, according to a recent report (172) (see Table 25). Ordinarily, the incidence of arthritis rises with age, but among Royal College OC users it did not. The protective effect lasted only while the women used OCs, and researchers could find no relationship with dose or duration of observation. In absolute terms, the effect would benefit perhaps 33 per 100,000 OC users per year.

Table 25. Rheumatoid Arthritis and Use of Oral Contraceptives in the Royal College of General Practitioners' Oral Contraception Study

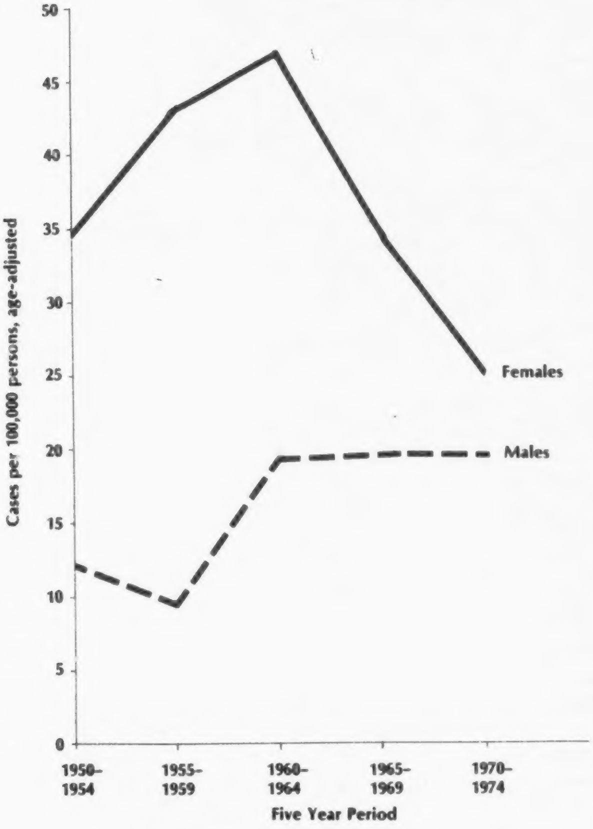
	Users	Former users	Non-users
Length of observation (woman-years)	60,607	36,008	100,047
No. of cases	18	19	57
Rate (per 1,000 woman-years)*	0.31	0.53	0.63
Ratio of rates (compared with nonusers)	0.49**	0.84	1.0

*Standardized for age, parity, smoking, and social class
**p<0.01

Source: Royal College of General Practitioners' Oral Contraception Study (172)

A study of 25-year incidence trends in a US community supports the Royal College finding. While the incidence of first diagnoses of rheumatoid arthritis rose for both men and women in the period from 1950 to 1965, the rate for women fell rapidly after 1965, as oral contraceptive use in the USA increased rapidly; during the same period the rate for men leveled off (109) (see Figure 15).

Figure 15. Age-adjusted Rates of Rheumatoid Arthritis in the Population of Rochester, Minnesota, USA, 1950–1974



Source: Linos et al. (109)

Earlier studies, all of them small, of oral contraceptive use and rheumatoid arthritis had produced conflicting results (26, 65, 194). The Walnut Creek study, contrary to earlier, small studies (26, 98), found that the prevalence of rheumatoid factor in the blood was lower in OC users than in nonusers, but not significantly so (189). Royal College researchers point out that pregnancy sometimes relieves the symptoms of rheumatoid arthritis; they postulate that suppression of autoimmune response by hormones may explain the protective effect both of OC use and of pregnancy (172).

Acute Hepatitis

Results from the Boston Collaborative Drug Surveillance Program suggest that users of oral contraceptives, especially young women, are more likely to be diagnosed as having acute hepatitis than are nonusers. The researchers found 68 cases of hepatitis and compared them with 1,142 women in the same hospitals for other reasons during the same period. Some 31 percent of the cases had recently used oral contraceptives, compared with 14 percent of the controls. After adjusting for age, hospital, and year of hospital admission, the relative risk estimate was 3.3, a statistically significant finding. Most of the difference between cases and controls was concentrated in women under age 25. Contrary to what would be expected if the association were causal, duration of use was shorter in cases than in controls (124).

While the researchers noted that oral contraceptives have been linked to gall bladder disease (27) and other changes in liver function, they could not explain an association between OC use and hospital admission for acute hepatitis. One possibility is that some of the cases were pill-related jaundice or some other specific drug reaction that was misdiagnosed (124). Another possibility is that, since hepatitis can be sexually transmitted, it is associated with frequency of coitus and number of partners rather than with OC use directly.

COMPARATIVE RISKS AND BENEFITS

What are the policy implications of both continued oral contraceptive use and continued evidence of health hazards among specific subgroups of women? On the one hand, decision makers are faced with a barrage of press and other news media publicity all too often reporting preliminary research results with little or no reference to or understanding of statistical significance, study design, or different risks for different subgroups of women. On the other hand, the need—and desire—for effective, reversible methods of contraception grows rapidly as both organized family planning programs and the pressures of social and economic change encourage individuals and families to try to control their fertility.

On the government and policy level, those who must decide how to deal with the pressures of burgeoning population and, on the personal level, those who face the threat of unwanted fertility can have no guarantees of absolute safety with or without any method of fertility control. Certainly high fertility and rapid population growth present threats to health and well-being far greater than those of contraceptive methods measured in these medical and epidemiological studies. The most prudent course is to compare, from the medical data available, the relative risks of different family planning methods—including no methods whatsoever—under different conditions of development and to design programs that attempt to provide the maximum benefits consistent with a broad range of choice and cultural acceptability.

Table 26. Annual Number of Birth-Related, Method-Related, and Total Deaths, by Method of Fertility Control, in a Hypothetical Cohort of 100,000 US Women

	Age in Years					
Regimen	**15-19**	**20-24**	**25-29**	**30-34**	**35-39**	**40-44**
No control						
Birth-related	5.3	5.8	7.2	12.7	20.8	21.6
Abortion only						
Method-related	1.0	1.9	2.4	2.3	2.9	1.7
OCs only/nonsmokers						
Birth-related	0.1	0.2	0.2	0.4	0.6	0.4
Method-related	0.6	1.1	1.6	3.0	9.1	17.7
Total deaths	0.7	1.3	1.8	3.4	9.7	18.1
OCs only/smokers						
Birth-related	0.1	0.2	0.2	0.4	0.6	0.4
Method-related	2.1	4.2	6.1	11.8	31.3	60.9
Total deaths	2.2	4.4	6.3	12.2	31.9	61.3
IUDs only						
Birth-related	0.1	0.2	0.2	0.4	0.6	0.4
Method-related	0.8	0.8	1.0	1.0	1.4	1.4
Total deaths	0.9	1.0	1.2	1.4	2.0	1.8
Barrier methods only						
Birth-related	1.1	1.5	1.9	3.3	5.0	4.0
Barrier methods, plus abortion						
Method-related	0.1	0.3	0.4	0.4	0.4	0.2

Source: Tietze and Lewit (199)

To evaluate these risks, C. Tietze, J. Bongaarts, and B. Schearer of the Population Council have designed a computer model that simulates reproductive events during the childbearing years of a hypothetical cohort of 100,000 nonsterile women using various family planning methods (196, 197, 198). Applying the model to developed country data and taking account of the Royal College mortality data and other recent research, Tietze suggests that for developed countries, with low rates of maternal mortality, use of OCs is very much safer than the use of no method at all (with ensuing pregnancies) for nonsmokers under 40 and somewhat safer for smokers under 30. In developed countries, after age 35 the risk of death to OC users who also smoke is about three times greater than normal childbirth and more than three times greater than the risk of OC use to nonsmokers. Tietze's calculations focus attention on the synergistic effects of smoking and OC use in women over 30 in the developed countries, women who may also have other factors predisposing them to vascular disease (see Table 26).

Overall, in developed countries the safest approach for any couple now seems to be using the diaphragm or condom combined with legal abortion in cases of failure and choosing voluntary sterilization after desired family size has been reached. Of course, legal, safe abortion is not available in many countries, and beyond the financial means of some women even where it is legal. Furthermore, many women find traditional methods so difficult or distasteful to use that they prefer orals even if the risk is somewhat greater.

Tietze's methodology has been applied to the developing countries by M. Potts, J.J. Speidel, and E. Kessel (146). They compare mortality rates for different methods and method combinations in moderately developed countries, such as Taiwan and Korea (LDCA), and in the least developed areas, such as Matlab Thana in Bangladesh (LCDB) (see Table 27). In so doing, they make a number of assumptions: for example, that fecundability is the same in developed and developing countries but that an 8-month longer period of lactational amenorrhea follows childbirth in developing countries; that maternal mortality in Korea and Taiwan is representative of rates for middle-income developing countries and, in Bangladesh, for poorer developing countries; that abortion mortality is twice as high in middle-income countries and five times as high in low-income developing countries as in the United States; that use-effectiveness of all methods except IUDs is slightly lower in developing countries; that method-related risks from IUDs and sterilization are two to five times higher in developing countries; and that risks of circulatory disease are lower.

Although Table 26 was prepared before the results of the Royal College study were published, it provides a reasonable comparative guide to the relative hazards of different methods within developed and developing countries. As would be expected, wherever high maternal mortality prevails, the comparative risk of oral contraceptive use is low. For all women in developing countries up to age 40, oral contraceptive use is substantially safer than no use of family planning at all. Even above age 40, in the least developed areas, OCs are safer than pregnancy. Overall, in developing countries as in developed ones, legal abortion

Table 27. Annual Number of Live Births, Birth-Associated Deaths, and Deaths Associated with Fertility Control per 100,000 Nonsterile Women, by Method of Fertility Control, Age, and Development of Country

	Age Group/Country Type																	
	15–19			20–24			25–29			30–34			35–39			40–44		
Method and Outcome	**DC**	**LDCA**	**LDCB**	**DC**	**LDCA**	**LDCB**	**DC**	**LDCA**	**LDCB**	**DC**	**LDCA**	**LDCB**	**DC**	**LDCA**	**LDCB**	**DC**	**LDCA**	**LDCB**
No control																		
Live births	50,770	41,440	41,440	61,400	45,940	45,950	59,290	43,170	43,170	55,730	39,930	39,930	47,700	34,210	34,210	31,680	23,940	23,940
Birth-associated deaths	5.6	8.3	290.0	6.1	9.2	183.8	7.4	10.8	215.9	13.8	20.0	199.7	21.0	34.2	171.0	22.6	35.9	191.5
Abortion																		
Induced abortions	99.502	99,502	99,502	133,664	133,664	133,664	132.041	132,041	132,041	127,278	127,278	127,278	106,209	106,209	106,209	64,779	64,778	64,778
Abortion-associated deaths	1.2	2.4	6.0	1.6	3.2	8.0	1.6	3.2	7.9	2.0	4.0	10.1	1.7	3.4	8.5	1.5	3.0	7.4
Oral contraceptives (without predisposing conditions)																		
Live births	1,150	1,590	1,590	1,940	2,650	2,650	1,910	2,600	2,600	1,770	2,410	2,410	1,350	1,840	1,840	650	890	890
Birth-associated deaths	0.1	0.3	11.1	0.2	0.5	10.6	0.2	0.7	13.0	0.4	1.2	12.0	0.6	1.8	9.2	0.5	1.3	7.1
Method-associated deaths	1.2	0.8	0.8	1.2	0.8	0.8	1.2	0.8	0.8	1.9	1.3	1.3	4.0	3.0	3.0	7.3	5.5	5.5
Total deaths	1.3	1.1	11.9	1.4	1.3	11.4	1.4	1.5	13.8	2.3	2.5	13.3	4.6	4.8	12.2	7.8	6.8	12.6
Oral contraceptives (with predisposing conditions)																		
Method-associated deaths	1.4	1.0	1.0	1.4	1.0	1.0	1.4	1.0	1.0	11.4	6.0	6.0	28.8	13.0	13.0	103.8	63.0	63.0
Total deaths	1.5	1.3	12.1	1.6	1.6	11.6	1.6	1.7	14.0	11.8	7.2	18.0	29.4	14.8	22.2	104.3	64.3	70.1
Intrauterine devices																		
Live births	1,150	1,140	1,140	1,940	1,920	1,920	1,910	1,890	1,890	1,770	1,750	1,750	1,350	1,330	1,330	650	640	640
Birth-associated deaths	0.1	0.2	8.0	0.2	0.4	7.7	0.2	0.5	9.5	0.4	0.9	8.7	0.6	1.3	6.6	0.5	1.0	5.1
Method-associated deaths	0.5	1.0	1.5	0.5	1.0	1.5	0.5	1.0	1.5	0.8	1.5	2.3	1.0	2.0	2.0	1.0	2.0	3.0
Total deaths	0.6	1.2	9.5	0.7	1.4	9.2	0.7	1.5	11.0	1.2	2.4	11.0	1.6	3.3	9.6	1.5	3.0	8.1
Traditional contraception																		
Live births	5.860	7,580	7,580	9.500	11,660	11,660	9.330	11,300	11,300	8,670	10,460	10,460	6,700	8,150	8,150	3,330	4,210	4,210
Birth-associated deaths	0.6	1.5	53.0	0.9	2.3	46.6	1.2	2.8	56.5	2.2	5.2	52.3	2.9	8.1	40.8	2.4	6.3	33.7
Traditional contraception and abortion																		
Induced abortions	7,564	10,273	10,273	11,444	15,483	15,483	11.332	15,317	15,317	10,913	14,764	14,764	8,650	11,721	11,721	4,608	6,271	6,271
Abortion-associated deaths	0.1	0.2	0.6	0.1	0.4	0.9	0.1	0.4	0.9	0.2	0.5	1.2	0.1	0.4	0.9	0.1	0.3	0.7
Tubectomy																		
Live births				0	100	100	0	100	100	0	90	90	0	70	70	0	30	30
Birth-associated deaths				0	0	0.4	0	0	0.5	0	0	0.4	0	0	0.4	0	0	0.2
Method-associated deaths*				0.5	0.9	2.3	0.6	1.2	3.0	0.9	1.7	4.4	2.3	4.6	11.5	13.3	26.7	66.7

DC = Developed Countries; LDCA = Less-developed countries type A; LDCB = Less-developed countries type B
*Mortality during the year of procedure divided by remaining years of fertility

Source: Adapted from Potts et al. (146).

used as a backup for condoms or a diaphragm is safer by an order or more of magnitude than any alternative or combination thereof. Tubectomy mortality, measured as posing a hazard only in the year that the procedure is performed, is in the same range of risk as pregnancy for women over 30 in all but the least developed countries, where it is much less dangerous. For a 35-year-old woman who would gain from tubectomy ten years of protection, the one-time risk of tubectomy spread over ten years may be lower than that of orals. In other words, for the great majority of developing country women under 40, OCs are safer than no method or traditional methods, about as safe as IUDs, and not quite as safe as sterilization or as traditional methods backed by legal abortion performed by trained practitioners.

What these analyses suggest is not that one or another method should be promoted to the exclusion of others—although the increase in safety where legal abortion is available is noteworthy—but rather that different methods may be particularly appropriate for different legal and medical circumstances.

Personal Benefits

The fact remains that despite some plateauing of oral contraceptive use in developed countries, due largely to a worldwide surge of interest in sterilization, especially among older couples, oral contraceptives remain the most popular reversible method of effective contraception. This is a testament to the benefits of the pill—benefits not easily weighed in the balance of medical judgements and epidemiologic studies—and to the fact that, for millions of women, those benefits outweigh the well-publicized but relatively small risks. The late Frederick S. Jaffe, President of the Alan Guttmacher Institute, summarized how individuals benefit from using oral contraceptives and put those benefits in context:

> The pill has two advantages that differentiate it sharply from most other methods:
>
> In the first place, it is the most effective method of preventing pregnancy currently available: as Norman Ryder's studies have shown, IUDs have a standardized 12-month failure rate two times greater than the pill, condoms three times, diaphragms four times and foam, rhythm, and douche more than five times (173).
>
> Secondly, because the pill is coitally independent, it makes possible a greater degree of freedom and spontaneity in sexual relations than methods that need to be applied at the time of intercourse.
>
> No other method meets these basic needs of sexually active persons as well as the pill. These factors suggest that the evaluation framework that has kept the pill in the headlines for the past few years is highly selective and does not reflect adequately the needs and purposes of persons who use contraception. This framework compares medical risks and medical risks alone. Those risks should not be ignored, and accurate information about them should be widely disseminated. But medical risk does not take into account at least two other aspects of the contraceptive experience that users evidently find salient: efficacy in preventing unwanted pregnancy and facilitation of more satisfactory sexual relations. Accurate information about these factors should also be widely disseminated and incorporated into the framework for assessment of risks and benefits.

What you should know about "the pill"
ORAL CONTRACEPTIVES

Figure 16. To facilitate distribution, three months supply of orals are included in one "Blue Lady" package. Twenty-one pills contain estrogen and progestin, seven pills provide an iron supplement in each of these USAID-supplied packets.

> Implicit in the medical-risk framework is the assumption that other methods of contraception could be substituted, thus rendering the risks from the pill unnecessary. This assumption is true for some persons, but not for all. . . . (87)

Increasing use of the pill in developing countries suggests that women there, like those in the developed world, appreciate the combination of effectiveness and independence from coitus that oral contraceptives provide. Under the circumstances and conditions many women face in developing countries, these benefits may be very important.

TABLES

Table 12. Various Circulatory System Diseases and Oral Contraceptive Use, Selected Studies, 1967–1977

Author & Date	Ref. No.	Description	Findings
Fuertes-de la Haba et al. 1970	63	Between July 1961 and early 1969, 9,633 Puerto Rican women ages 21–40 were assigned at random to use either OCs (n=4,846) or vaginal contraceptives (n=4,787). Each participant received an annual physical examination and was interviewed every 2 months.	4 deaths not explained by predisposing medical conditions—2 in OC users, 2 in vaginal users. One OC user died 56 days postpartum, diagnosis was congestive heart failure; the other, coronary thrombosis. Both were age 25. One in vaginals group died of pulmonary infarction, one diagnosed as cerebral hemorrhage.

Table 12 (Continued)

<table>
<tr><td>Royal College of General Practitioners 1967</td><td>166</td><td>Case-comparison study. OC use in 147 women aged 15–49 diagnosed as having thromboembolic disease, cerebral embolism or thrombosis, subarachnoid hemorrhage or various arteriosclerotic heart diseases between 1961 and 1966 by 29 British general practitioners was compared to OC use in 2 comparison groups selected from same doctors' files.</td><td>11.6% of cases were or had been OC users, compared with 5.8% of controls. Venous thromboembolic disease: 16.5% of cases were users, 6.7% of controls. Differences between other disease cases and controls not significant: numbers of cases small. Cases were about 4 times as likely to be pregnant or puerperal as were controls.</td></tr>
<tr><td>Royal College of General Practitioners 1974</td><td>167</td><td>Cohort study conducted in Britain, compares disease occurrence in OC users, nonusers, and those who stopped OC use during study. Study began in 1968 with 23,000 users and 23,000 nonusers, all married and matched for age within 3 years. Total woman-years of observation: users, 34,875; controls, 42,306. Hypertension evaluated according to the customary criteria of participating physicians.</td><td>
<table>
<tr><th></th><th colspan="2">Rate per 1,000 woman-years (number of cases in parentheses)</th><th></th></tr>
<tr><th></th><th>Users</th><th>Controls</th><th>Ratio</th></tr>
<tr><td>Acute MI</td><td>0.13(5)</td><td>0.02(1)</td><td>5.22</td></tr>
<tr><td>Angina pectoris</td><td>0.21(8)</td><td>0.21(8)</td><td>1.03</td></tr>
<tr><td>Subarachnoid hemorrhage</td><td>0.07(2)</td><td>0.02(1)</td><td>3.77</td></tr>
<tr><td>Cerebral thrombosis</td><td>0.13(4)</td><td>0.00(0)</td><td>—(p < 0.01)</td></tr>
<tr><td>Acute but ill-defined cerebrovascular disease</td><td>0.16(5)</td><td>0.00(0)</td><td>—(p < 0.05)</td></tr>
<tr><td>All cerebrovascular disease</td><td>0.41(16)</td><td>0.10(4)</td><td>4.10(p < 0.01)</td></tr>
<tr><td>Hypertension</td><td>6.62(236)</td><td>2.56(105)</td><td>2.59(p < 0.01)</td></tr>
</table>
With hypertension, bias likely because users have blood pressure checked more often than do nonusers. Incidence during first year of OC use "probably little higher than the rate to be expected in a comparable population of nonpregnant non-users" but rose with duration of use. Incidence related to age of users and to progestin dose in OCs (see Table 17: Royal College of General Practitioners 1977 (168).</td></tr>
<tr><td>Royal College of General Practitioners 1977</td><td>169</td><td>Cohort study described above. Causes of the 101 deaths that occurred through June 1976 analyzed according to contraceptive status of women. Length of observation in women-years: nonusers—110,065; users and exusers—96,624.</td><td>
<table>
<tr><th></th><th colspan="3">Death rate per 100,000 woman-years of observation</th><th colspan="3">Ratio of user death rate to nonusers'</th></tr>
<tr><th></th><th>Current users</th><th>Ex-users</th><th>Non-users</th><th>Ever-user (95% confidence interval)</th><th>Current users</th><th>Ex-users</th></tr>
<tr><td>All circulatory system disease</td><td>26.8</td><td>23.9</td><td>5.5</td><td>4.7*
(1.7–14.0)</td><td>4.9</td><td>4.3</td></tr>
<tr><td>Non-rheumatic heart disease</td><td>12.1</td><td>7.6</td><td>2.6</td><td>4.0**
(1.3–26.0)</td><td>4.7**</td><td>3.0</td></tr>
<tr><td>Myocardial infarction</td><td>8.1</td><td>3.1</td><td>2.5</td><td>NA</td><td>3.2</td><td>1.3</td></tr>
<tr><td>Cerebrovascular disease</td><td>12.4</td><td>14.7</td><td>28.</td><td>4.7**
(1.2–21.4)</td><td>4.4</td><td>5.3</td></tr>
<tr><td>Subarachnoid hemorrhage</td><td>9.3</td><td>15.9</td><td>0.0</td><td>—**</td><td>—**</td><td>—**</td></tr>
<tr><td>Cerebral thrombosis and hemorrhage</td><td>2.6</td><td>0.0</td><td>2.8</td><td>NA</td><td>0.9</td><td>0.0</td></tr>
</table>
*p < 0.01 **p < 0.05
Rates standardized for age at entry, parity, social class, and smoking. Comparing users and exusers with controls, ratio of rates from all circulatory system diseases, standardized for age, was 3.4 for 1-59 months use, 9.7 for 60 months or more. Also, ratios were 2.0 for ages 25–23, 4.5 for ages 35–44.</td></tr>
</table>

Table 12 (Continued)

<table>
<tr><td>Vessey et al. 1976</td><td>213</td><td>Cohort study. Reports rates of hospital admissions and outpatient attendances for 17,032 white, female British family planning clinic clients aged 25–39. 56.6% used OCs at time of entry into study (followed 31,076 woman-years), 24.8% used diaphragms (followed 14,739 woman-years), and 18.6% used IUDs (followed 10,014 woman-years). Rates standardized for age (four groups), parity (parous or nulliparous), social class, and smoking (three groups).</td><td>Standardized rates (per 1,000 woman-years) by contraceptive method on admission to study:
<table>
<tr><th>Disease</th><th>Orals</th><th>Diaphragms</th><th>IUDs</th></tr>
<tr><td>All circulatory system disease</td><td>9.80*</td><td>13.36</td><td>17.27</td></tr>
<tr><td colspan="4">(Difference due largely to exclusion of women with varicose veins from OC use before entry into study.)</td></tr>
<tr><td>Cerebrovascular disease</td><td>0.43**</td><td>0.006</td><td>0</td></tr>
<tr><td>Venous thrombosis & pulmonary embolism</td><td>0.89</td><td>0.61</td><td>0.56</td></tr>
<tr><td>As above, new cases only</td><td>0.86</td><td>0.38</td><td>0.32</td></tr>
<tr><td>Hypertension</td><td>1.59</td><td>1.68</td><td>0.68</td></tr>
</table>
Rates by contraceptive methods used during follow-up; new cases only:
<table>
<tr><th></th><th>Orals</th><th>Not orals</th></tr>
<tr><td>Cerebrovascular disease</td><td>0.45**</td><td>0.09</td></tr>
<tr><td>Venous thrombosis & pulmonary embolism</td><td>1.06**</td><td>0.33</td></tr>
<tr><td></td><td>1.06</td><td>0.33</td></tr>
</table>
10 of 13 were OC users at time of occurrence of cerebrovascular disease.
*p<0.001 **p<0.01</td></tr>
<tr><td>Vessey et al. 1977</td><td>215</td><td>As above (213). Length of observation was: OCs—49,681 woman-years; diaphragms—22,937 woman-years; IUDs—16,209 woman-years. Generally, OC users had fewer risk factors for cardiovascular diseases than did others except that they smoked more.</td><td>43 deaths occurred among study participants, 9 from cardiovascular disease. All 9 were OC users (includes 12 deaths of women deleted from study and not included in rate calculations). Rates for OC users, standardized for age, parity, social class, and smoking:
All circulatory disorders: 13.6*
Non-rheumatic heart disease: 9.8
Cerebrovascular disease: 3.8
*Significantly different from rates of 0.0 in diaphragm and in IUD users (p<0.05).
5 of the 9 women dying from cardiovascular disease smoked 15 to 20 cigarettes per day.</td></tr>
</table>

Table 15. Venous Thromboembolism, Stroke, and Oral Contraceptive Use, Selected Studies, 1968–1978

<table>
<tr><th>Author & Date</th><th>Ref. No.</th><th>Description</th><th>Findings</th></tr>
<tr><td>Badaracco & Vessey 1974</td><td>13</td><td>76 women with previous diagnosis of deep vein thrombosis or pulmonary embolism without evident predisposing cause were asked about recurrences of thromboembolic disorders. About half had been using OCs within 1 month of previous diagnosis. Subsequent use of OCs negligible.</td><td>
<table>
<tr><th></th><th colspan="2">Proportion free of recurrences unrelated to childbearing</th></tr>
<tr><th></th><th>Former Users</th><th>Non-users</th></tr>
<tr><td>After 3 years</td><td>92%</td><td>64%</td></tr>
<tr><td>After 6 years</td><td>86%</td><td>57%</td></tr>
</table>
3 former users and 3 nonusers had recurrences related to childbearing.</td></tr>
<tr><td>Collaborative Group for the Study of Stroke in Young Women 1973 & 1975</td><td>40, 41</td><td>Case-comparison study. OC use in 429 women with cerebrovascular diseases, admitted to 91 hospitals in 12 US cities in a 2-year period and who could be interviewed, compared with that in women from the same hospitals (n=393) and from cases' neighborhoods (n=450), matched for age by decade and race.</td><td>Overall, and in each 10-year age group, almost twice as many cases as controls were current users of OCs. Relative risk was higher in whites than in blacks.
Relative risk estimates, based on matched pairs:
<table>
<tr><th></th><th>Hospital Controls</th><th>Neighborhood Controls</th></tr>
<tr><td>Thrombotic stroke</td><td>9.5</td><td>8.8</td></tr>
<tr><td>Hemorrhagic stroke</td><td>2.0</td><td>2.3</td></tr>
<tr><td>Other strokes</td><td>1.1</td><td>1.0</td></tr>
</table></td></tr>
</table>

Table 15 (Continued)

			Smoking alone significantly increased risk of hemorrhagic stroke but not of thrombotic stroke. OC use and smoking had synergistic effect on occurrence of hemorrhagic stroke. Risk of stroke associated with OC use not synergistic with risk associated with hypertension.
Fuertes-de la Haba et al. 1971	64	Between July 1961 and May 1969, 9,898 Puerto Rican women aged 21–40 were assigned at random to use either OCs (n=4,965) or vaginal contraceptives (n=4,933). Each participant received an annual physical examination and was interviewed every 2 months. As of June 1969, 87% were still being followed.	17 first occurrences of nonpuerperal **thrombophlebitis** not associated with other conditions were reported, 9 in the OC group, 8 in the vaginal contraceptive group. Incidence rates: 1.8/1,000 in OC group; 1.6/1,000 in vaginal contraceptive group. Not a statistically significant difference. No significant differences found after adjustment for several variables nor in probabilities of developing thrombophlebitis during the study's 8-year period (4.5/1,000 in the OC group; 4.0/1,000 in the vaginal contraceptive group).
Greene & Sartwell 1972	71	Case-comparison study. OC use compared in 60 cases of **thromboembolic disease** developing after hospital admission for surgery, trauma, systemic infection, or immobilization, and in one or two controls each (n=98), all admitted to hospitals for reasons similar to those of cases, matched to cases by race (all Caucasian), marital status, age within 10 years, and date of hospital discharge within one year.	35% of cases and 16.7% of controls had used OCs within 1 month of hospital admission. In 13 case-control pairs, only case had used OCs; in two, only the control. Relative risk estimate: 6.5 (p=0.007). No difference in duration of use between case-users and control-users. Risk appeared to cease when OC use stopped.
Hoover et al. 1978	79	65,843 women from the Boston (USA) area answered a 1970 questionnaire about lifetime OC use and 1969 hospitalizations. Rates of hospitalization of ever-users and non-users compared.	Annual rate of hospitalization for **thromboembolism** per 1,000 women: users: 2.0; nonusers: 1.3 (p=0.06); relative risk: 1.5. Age 25–29; users: 2.0; nonusers: 0.4 (p<0.05); relative risk: 5.0. (Young age group most likely to be free of factors predisposing to thromboembolism, which might obscure effect of OCs.) Rate of hospitalization did not increase with duration of use. OC users hospitalized 20–40% more frequently than nonusers, whether or not condition associated with OC use.
Inman & Vessey 1968	83	Case-comparison study. 309 deaths due to **thrombosis** or **embolism** (99 pulmonary, 209 coronary or myocardial infraction, 30 cerebral) that occurred in 1966 in married, nonpregnant women aged 20–44 in England, Wales, and Northern Ireland were examined via interviews with doctors. OC use in these women was compared with use in 998 women whose records were drawn from the files of cases' doctors. Two groups of cases: Class A—without known predisposing conditions; Class B—with known predisposing causes.	Pulmonary embolism: Class A—16 or 26 cases had been using OCs at time of death, compared with 4.2 expected based on controls of like parity and age (p<0.001); Class B—9 of 49 in whom contraceptive practice known were OC users, compared with 6.8 expected. Coronary thrombosis: Class A—18 of 84 in whom contracptive practice was known were OC users, compared with 11.4 expected; Class B—5 of 110 of known contraceptive status had been OC users, compared with 12.6 expected. Cerebral thrombosis: Class A—5 of 10 were OC users, compared with 1.5 expected (p<0.01); Class B—none of 16 of known contraceptive status was an OC user.
Inman et al. 1970	84	The distribution, types, and doses of OCs used by women in 1,024 cases of **thromboembolism** in OC users reported to the Committee on Safety of Drugs (UK) between January 1965 and June 1969 were compared to expected distribution based on sales data.	Of 920 reports from the UK involving combined OCs, high estrogen doses more frequent than expected, especially for pulmonary embolism, cerebral thrombosis, and coronary thrombosis. No consistent differences seen between reported and expected cases according to type of regimen (sequential or combined).
Jick et al. 1978	95	Case-comparison study. OC use by 14 premenopausal women without factors predisposing to **stroke** and without contraindications to OC use, admitted with diagnoses of stroke to 21 hospitals in 7 countries since 1969 or to 24 Boston (USA) area hospitals in 1972, was compared with OC use by four controls for each case, matched for country, age (±4 years), and criteria for inclusion of cases. Most of strokes were thrombotic, not hemorrhagic.	11 of 14 cases (79%) had used OCs just before admission, compared with 7 of 56 controls (13%). Risk did not appear to change with age, and smoking only weakly associated with risk of stroke. Relative risk estimate: 26:1. "Although the current results indicate that oral contraceptives markedly increase the risk of stroke in healthy young women, it is worth emphasizing that the illness is rare in this population."

Table 15 (Continued)

<table>
<tr>
<td>Petitti & Wingerd 1978</td>
<td>144</td>
<td>Case-comparison study. In the Walnut Creek Contraceptive Drug Study, 11 of 16,759 participants developed subarachnoid hemorrhage. Each case was matched with all women from study of same age (total, 3,956 controls; range 197–516 per case). Of the cases, 9 were or had been OC users, 8 were smokers at entry to study.</td>
<td>
<table>
<tr><th></th><th>Percentage
Cases</th><th>
Controls</th><th>Relative risk</th></tr>
<tr><td>Current users of OCs</td><td>36.4</td><td>10*</td><td>6.5</td></tr>
<tr><td>Smokers at entry to study</td><td>72.7</td><td>33*</td><td>5.7</td></tr>
<tr><td>Current OC users and smokers at entry</td><td>36.4</td><td>3.2**</td><td>21.9</td></tr>
<tr><td>Past users of OCs</td><td>71.4</td><td>35.6*</td><td>5.3</td></tr>
</table>
*p<0.05 **p<0.001

"Because of the small number of cases it is not possible to determine the magnitude of risk associated with current or past OC use separately for non-smokers. . . ."
</td>
</tr>
<tr>
<td>Petitti et al. 1978</td>
<td>145</td>
<td>Case-comparison study of 38 cases of thromboembolic disease without immediate predisposing factors and, as controls, women of the same age as each case (total of 8,174 controls), all from the Walnut Creek Contraceptive Drug Study. 17 cases occurred in the absence of hypertension, diabetes, varicose veins, or history of thromboembolism.</td>
<td>
Cases without other risk factors (n=17) and controls:
<table>
<tr><th>Percentage OC users
Cases</th><th>
Controls</th><th>Relative risk estimate</th></tr>
<tr><td>53</td><td>19</td><td>7.7</td></tr>
</table>
No interaction of tobacco and OC use observed, although smoking was an independent risk factor. In all 38 cases and their controls, OC use was twice as frequent in cases, not a statistically significant difference. Hypertension, diabetes, varicose veins, and previous thromboembolic disease also risk factors for venous thromboembolism.
</td>
</tr>
<tr>
<td>Royal College of General Practitioners 1978</td>
<td>170</td>
<td>Cohort study of British OC users, nonusers, and former users, begun in 1968, collecting records of their physicians' diagnoses of illness. Considers only cases without predisposing factors. Periods of observation: users: 34,482 woman-years; former users: 14,769; nonusers: 47,084.</td>
<td>
<table>
<tr><th colspan="3">Rate per 1,000 woman-years (number of cases)</th><th colspan="2">Ratio of rates</th></tr>
<tr><th>Users</th><th>Ex-users</th><th>Nonusers</th><th>Users/ nonusers</th><th>Ex-users/ nonusers</th></tr>
<tr><td colspan="5">Deep vein thrombosis of leg</td></tr>
<tr><td>0.82
(30)</td><td>0.15
(2)</td><td>0.20
(9)</td><td>4.17*</td><td>0.75</td></tr>
<tr><td colspan="5">Superficial vein thrombosis of leg</td></tr>
<tr><td>1.86
(67)</td><td>0.87
(12)</td><td>0.77
(36)</td><td>2.41**</td><td>1.13</td></tr>
</table>
*p<0.01; 95% confidence interval: 2.1–10.9
**p<0.01; 95% confidence interval: 1.4–12.7

No relationship with smoking observed.

Rates per 1,000 woman-years (no. of cases) among women using OCs consisting of ethinyl estradiol 50 μg + norethisterone acetate in varying amounts:
<table>
<tr><th></th><th>1 mg</th><th>3 mg</th><th>4 mg</th></tr>
<tr><td>Deep vein thrombosis of leg</td><td>0.78(5)</td><td>0.91(7)</td><td>0.0(0)</td></tr>
<tr><td>Superficial vein thrombosis of leg</td><td>0.63(4)</td><td>2.09(16)</td><td>2.25(3)</td></tr>
</table>
</td>
</tr>
<tr>
<td>Sartwell et al. 1969</td>
<td>177</td>
<td>Case-comparison study. OC use in 175 women aged 15–44 discharged from 43 US hospitals after diagnosis of thrombophlebitis, pulmonary embolism, cerebral thrombosis of embolism without evident predisposing conditions or events was compared with OC use in 175 women discharged from same hospitals within 6 months of cases and individually matched for age within 5 years, residence, race, parity, and hospital pay status. Those infertile or with chronic diseases were excluded from study.</td>
<td>67 cases and 23 controls had used OCs within 1 month of hospitalization. 67 cases and 23 controls had stopped using OCs earlier. Duration of use did not affect risk. In 57 case-control pairs, only the case had used OCs within one month of hospitalization; in 13, only the control had used OCs. Estimated relative risk: 4.4 (p<0.001).</td>
</tr>
</table>

Table 15 (Continued)

<table>
<tr><td>Stolley et al. 1975</td><td>192</td><td>Case-comparison study involving 461 women ages 15–49 with thromboembolic disease except cerebrovascular accidents who were admitted to 37 US hospitals, 1970–73. 1,302 controls selected from women admitted to the same hospitals within 14 months of cases and matched for race, age (three groups), and marital status. 104 cases were classified "idiopathic," i.e., without history or evidence of previous thrombosis, predisposing disease, or recent surgery or trauma. These women were considered separately, since the others might have been advised against using OCs.</td><td>
<table>
<tr><th></th><th colspan="2">% using OCs within one month of hospital admission</th><th>Relative risk†</th></tr>
<tr><th></th><th>Cases</th><th>Controls</th><th></th></tr>
<tr><td>All cases</td><td>30.2</td><td>18.7</td><td>1.9*(2.1)</td></tr>
<tr><td>"Idiopathic" cases</td><td>56.7</td><td>18.8</td><td>7.2*(6.1)</td></tr>
</table>
*p< 0.001
†Relative risk estimates after adjustment for other relevant differences between cases and controls are shown in parentheses.

Relative risks slightly higher for those using OCs containing 100 μg estrogen or more than for those using less estrogen.</td></tr>
<tr><td>Vessey & Doll 1968</td><td>211</td><td>Case-comparison study. OC use in 58 married women under age 40, admitted to 19 British hospitals, 1964–1966, for deep vein thrombosis or pulmonary embolism without evident predisposing factors, compared with OC use in two women selected for each case, in hospital for acute medical or surgical condition or for elective operation and matched for hospital, date of admission (±four months), age (±four years), parity, and the criteria for acceptance of the cases. Cases of cerebral thrombosis and coronary thrombosis also examined and compared with controls selected for thrombosis and pulmonary embolism cases.</td><td>45% of cases used OCs within 1 month of occurrence of the disease, 9% of controls (p< 0.001). Nonuser cases had more frequently had previous thromboembolic attacks than had users, but difference in OC use was significant among those without previous attacks (p< 0.001). Cases were heavier smokers than controls, but difference "statistically not quite significant." Among cerebral thrombosis cases, 5 of 9 had used OCs within one month of illness; among coronary thrombosis cases, none of 13.</td></tr>
<tr><td>Vessey & Doll 1969</td><td>212</td><td>As above (211), with the addition of 26 more cases of venous thromboembolism, all diagnosed in 1967, and two controls each. Also, 10 additional cerebral thrombosis cases and 4 coronary thrombosis cases were considered.</td><td>Of the 1967 cases, 62% used OCs; of the controls, 25% (p< 0.001). Of a total of 19 cases of cerebral thrombosis, 11 were users. Based on controls for venous thromboembolism cases, adjusting for age, parity, and year of hospital admission, expected number was 3.5 (p< 0.001). Coronary thrombosis: 2 of 17 cases had been OC users; expected, 2.1.</td></tr>
</table>

Note: See also Table 12: Vessey et al. 1976 (213); Vessey et al. 1977 (215).

Table 16. Myocardial Infarction (MI) and Oral Contraceptive Use, Selected Studies, 1967–1978

Author & Date	Ref. No.	Description	Findings
Arthes & Masi 1976	11	Case-comparison study. OC use in 136 women aged 30–44 diagnosed in 47 US hospitals as having myocardial infarction compared with that in: 354 women aged 30–44., patients at same hospitals, selected as controls for a study of thromboembolic disease.	Among the 65 menstruating cases, 8 used OCs; 4.7 expected. Difference statistically significant (p<0.02) for 35–39 age group (5 users in 15 cases, 2 in 34 controls). Cases significantly more likely than expected to be smokers.
Bengtsson et al. 1973	20	Case-comparison study. OC use in 29 women with agina pectoris and 23 with "coronary ECG" found in a population survey of women aged 38, 46, 50, 54, and 60 in Göteborg, Sweden, and in 47 Göteborg-born women who had been hospitalized for heart attacks, 1968–70, compared with OC use in all 1,462 women interviewed in the population survey.	12% of women aged 38 in the population study were current OC users and another 12% had been users. None of the cases had ever used OCs.

Table 16 (Continued)

<table>
<tr><td>Jick et al. 1978</td><td>94</td><td>Case-comparison study. OC use in 26 women under age 46, admitted to various US hospitals in the first half of 1975 for nonfatal MI, all of them potential OC users without medical conditions predisposing to MI, was compared with OC use in 59 controls, matched to cases for hospital and time of admission, all of them potential OC users without contraindications to use.</td><td>
<table>
<tr><th>Cases</th><th colspan="2">Percent</th></tr>
<tr><th></th><th>Cases</th><th>Controls</th></tr>
<tr><td>OCs, regardless of smoking</td><td>77</td><td>24</td></tr>
<tr><td>Smoking, regardless of OC use</td><td>92</td><td>36</td></tr>
<tr><td>Smoking, OCs</td><td>69</td><td>7</td></tr>
<tr><td>OCs, no smoking</td><td>8</td><td>17</td></tr>
<tr><td>Smoking, no OCs</td><td>23</td><td>29</td></tr>
</table>
Estimate of risk associated with OC use: 14:1; associated with smoking >25 cigarettes per day: 34:1. ". . . acute MI in otherwise healthy premenopausal women is almost exclusively an illness of cigarette smokers. Therefore, we estimate that among nonsmokers the risk of nonfatal MI attributable to oral contraceptives . . . is extremely small."</td></tr>
<tr><td>Mann et al. 1975</td><td>118</td><td>Case-comparison study. OC use in 58 living women under age 45 with diagnosis of myocardial infarction compared with that in 166 controls, from same English and Welsh hospitals, matched for marital status, 5-year age group, and year of admission to hospitals.</td><td>29.3% of cases had used OCs within a month of heart attack, compared with 8.4% of controls. Relative risk: 4.5 (p < 0.001). After accounting for tobacco use, relative risk: 3.2 (Independent of OC use, relative risk of smoking 15 to 24 cigarettes a day was 4.1 times that for nonsmokers; 25 or more cigarettes a day, 11.3.)</td></tr>
<tr><td>Mann et al. 1975</td><td>117</td><td>As above (118), but involving 14 cases and their controls (n=24) from another region of England.</td><td>3 cases (21.4%) and 2 controls (8.3%) had used OCs within one month of admission to hospital. When data from all regions were combined, 27.8% of 72 cases and 8.4% of 190 controls were "current" users. Risk ratio: 4.2 (p< .001); after standardization for cigarette smoking and other risk factors for MI: 3.1 (p<0.05). "No appreciable difference" in proportions of ex-users among cases and controls.</td></tr>
<tr><td>Mann & Inman 1975</td><td>115</td><td>Case-comparison study. All deaths from myocardial infarction in England and Wales, 1973, of women under age 40, half those of women ages 44–44, and 1 in 5 of those of women 45–49 on which information could be obtained—a total of 153—were examined. Comparison group was living women, 1 or 2 matched to each case by five-year age group and marital status, chosen from files of the cases' doctors.</td><td>
<table>
<tr><th></th><th colspan="2">Percentage Using OCs</th><th></th></tr>
<tr><th>Age</th><th>Cases</th><th>Controls</th><th>Relative Risk</th></tr>
<tr><td>40</td><td>44.7</td><td>22.4</td><td>2.8 (p < 0.02)</td></tr>
<tr><td>40–44</td><td>15.4</td><td>3.8</td><td>4.7 (p < 0.05)*</td></tr>
<tr><td>All</td><td>21.4</td><td>10.5</td><td>NR</td></tr>
</table>
Average use longer among cases than among controls. Proportions of ex-users among cases and controls similar. Use of high dose estrogen products before 1970 was not more common among cases.
*See Mann et al. 1976 (116), below.</td></tr>
<tr><td>Mann et al. 1976</td><td>116</td><td>As above (115), including 54 more deaths due to myocardial infarction in the 40–44 age group, for a total of 106, and 50 more controls.</td><td>Based on larger numbers, relative risk of fatal MI in OC users ages 40–44 compared to nonusers of same age: 2.8. After adjustment for differences in other risk factors (not including smoking): 2.7.</td></tr>
<tr><td>Rosenberg et al. 1976</td><td>159</td><td>Case-comparison study. Use of oral contraceptives and other estrogen-containing products was compared in 34 women with nonfatal MI and in 1,213 women admitted for other reasons, excluding reasons which might be associated with use of estrogens, to 45 hospitals in 7 countries, 24 of the 45 in the area of Boston (USA). Study participants were all premenopausal women who could be interviewed.</td><td>Of 34 with nonfatal MI, 4 (11.8%) used OCs and 2 (5.9%) used other estrogen-containing products. In the comparison group of 1,213, use was 6.5% and 2.1%, respectively. Crude rate ratio for OCs: 1.9; standardized for age, cigarette smoking, and other risk factors: 1.3; crude rate ratio for other estrogen products: 2.8; standardized: 2.1. Differences not statistically significant.</td></tr>
<tr><td>Rosenberg et al. 1977</td><td>160</td><td>Case-comparison study. OC use in 159 cases of premenopausal MI leading to hospitalization compared with that in 3,180 controls. All participants were married female nurses in US states.</td><td>13% of cases were current users of OCs, compared with 8.6% of controls. After adjustment for other relevant variables, including cigarette smoking, risk for current users relative to never users was 1.8 (95% confidence interval: 1.1 to 3.0).</td></tr>
</table>

Note: See also Table 15: Inman & Vessey 1968 (83).

Table 17. Hypertension and Oral Contraceptive Use, Selected Studies, 1969–1978

Author & Date	Ref. No.	Description	Findings
Clezy et al.	39	77 Australian women aged 17–40 had blood pressure checked before and, at approximately 3-month intervals, for 3 months to 2 years after 74 started using OCs. Hypertension defined as blood pressure of 150/90 mm Hg or higher.	Mean systolic pressure significantly higher during OC use. Of 240 readings before OC use, percentage hypertensive: systolic—1.29; diastolic—6.49; both—0 During use: diastolic—28.4; systolic—23.0; both—23.0. Six developed sustained systolic hypertension, including 3 who also developed sustained diastolic hypertension and experienced symptoms. Incidence of hypertension higher in those with history of hypertension in pregnancy or with familial history than in those without such backgrounds. Hypertension likely to develop soon after starting OC use.
Fisch & Frank 1977	58	Cohort study, at the Kaiser-Permanente Medical Care Program, Walnut Creek, California (USA). 9,511 women were examined 2 or more times; 3,847 only once. 4,088 were OC users at time of examination; 4,609 were past users; 4,661, never users. Elevated blood pressure defined as over 140/90 mm Hg.	Age-adjusted proportion with elevated blood pressure lower for past users than for never users, significantly higher for current users (4%) than for past or never users (1.5%). Women over age 35 accounted for the difference. Dose, duration of use, and chemical composition of OCs unrelated to blood pressure change. OC use did not interact with alcohol consumption, age, family or personal history of hypertension, or relative weight. For those examined twice, mean change in blood pressure was not significant either for those not using OCs at both exams nor for those using OCs at both exams. Significant decrease in those who had stopped using OCs between exams. Increases of roughly equal magnitude for all women can be inferred.
Greenblatt & Koch-Weser 1974	69	Case-comparison study. Blood pressure readings taken for 921 women aged 20–44, admitted to 24 Boston area hospitals for acute illness or elective surgery in 10 months of 1972, who were free of chronic disease, histories of hypertension, diabetes, myocardial infarction, and other diseases possibly related to or contraindicating OC use. Hypertensive blood pressure defined as 140/90 mm Hg or higher.	289 (31.4%) hypertensive. 63 (21.8%) used OCs, compared with 125 (19.8%) of normotensives. Age-standardized risk ratio: 1.47 ($p < 0.05$). In 4 of 5 five-year age groups, OC use was more prevalent among hypertensives. Mean blood pressures were higher in users than in nonusers, but differences were not statistically significant.
Hoover et al. 1978	79	Cohort study. 65,843 women from the Boston (USA) area answered a 1970 questionnaire about lifetime OC use and 1969 hospitalizations. Rates of hospitalization of ever-users and nonusers compared.	Annual hospitalization rate per 1,000 women: users: 1.0; nonusers: 0.3 ($p < 0.05$); risk ratio: 3.3. Rate of hospitalization increased with duration of use. OC users hospitalized 20–40% more frequently than nonusers, whether or not for conditions associated with OC use.
Kunin et al. 1969	106	Blood pressure readings were taken for 2,302 working white women aged 15–44 in Virginia (USA). 496 (31.5%) were OC users. Mean blood pressures, adjusted for age, height, weight, and arm circumference, compared between OC users and nonusers. Also compared were readings taken in 517 study participants a year after the first readings.	Mean adjusted blood pressure at first reading slightly higher in OC users—2.3 mm Hg systolic, 1.2 mm Hg diastolic (p 0.05). In those who used OCs at both examinations diastolic pressure only rose, but not significantly in those who were nonusers at both exams. No significant changes in mean blood pressure in the few changing contraceptive status between exams.
Pritchard & Pritchard 1977	147	Blood pressure measurements before and during OC use were taken for 180 primiparous US women. 26 of these had had eclampsia or overt pregnancy-induced hypertension. Also recorded were blood pressure measurements for 200 young nulliparous women using an OC for the first time. All participants used the same OC (norethindrone 1 mg + mestranol 50 μg).	9 (5.8%) of the primiparas developed diastolic pressures over 90 mm in the 3-year follow-up period, 5 within 3 months after starting OCs. Pressure remained high in 5 after they stopped OC use, implying underlying chronic hypertension. None of 26 who had eclampsia developed hypertension while using OCs. 5 of 200 (2.5%) nulliparas developed diastolic pressures of >90 mm. Mean systolic and diastolic pressures did not change markedly for any group. "The frequency and the intensity of the hypertension identified in this study do not appear sufficiently great to preclude the use of oral contraception by all women who suffered pregnancy-induced hypertension during their first pregnancies."

Table 17 (Continued)

<table>
<tr><td>Ramcharan et al. 1974</td><td>149</td><td>Walnut Creek cohort study. Comparing prevalence at time of entry and subsequent occurrence of diseases in 11,672 women, aged 20–54. At entry into the study between December 1968 and December 1971, 3,569 had never used OCs, 3,851 were current users, 4,252, former users. Average period of observation was over 19 months for all three groups. Hypertension defined according to individual criteria of 30 participating internists.</td><td>Prevalence of hypertension at entry into study age-adjusted: current users, 13.9/1,000; never users, 7.8/1,000 ($p < 0.05$); past users, 6.7/1,000. Higher rates for users than never users in all 5-year age groups except < 25 group. Incidence in users relative to that in never users increased with age. Rates of occurrence of hypertension during study, age-adjusted: current users, 6.2/1,000; never users, 0.9/1,000 ($p < 0.001$); past users, 1.1/1,000.</td></tr>
<tr><td>Ramcharan et al. 1977</td><td>150</td><td>Walnut Creek cohort study. Incidence of labile and essential hypertension in 14,089 white women aged 20–54 who, at entry into study between December 1968 and February 1972, were free of hypertension. Average follow-up: OC users at entry (n=3,815): 39.9 months; past users (n=4,441), 37.5; never users (n=4,479), 41.0. High blood pressure defined as 140/90 mm Hg. 1,354 women using estrogen hormones were studied separately, regardless of OC use status.</td><td>Age-adjusted rates per 1,000 woman-years:
<table>
<tr><th></th><th colspan="4">Hormone use at entry into study</th></tr>
<tr><th>Hypertension</th><th>Never</th><th>OCs, Past</th><th>OCs, Current</th><th>Estrogen</th></tr>
<tr><td>Essential</td><td>4.1</td><td>4.5</td><td>4.8</td><td>5.1</td></tr>
<tr><td>Essential & labile</td><td>7.1</td><td>7.3</td><td>10.3</td><td>11.0</td></tr>
</table>
Estimated risks relative to never users, standardized for weight, parity, parental history of hypertension, and utilization of medical services:
<table>
<tr><th></th><th>Past Users</th><th>Current Users</th></tr>
<tr><td>Essential</td><td>1.12</td><td>1.31</td></tr>
<tr><td>Essential & labile</td><td>1.06</td><td>1.57*</td></tr>
</table>
*($p < 0.01$)
Duration of use had no clear effect on incidence rates or relative risk. Ratio of rates (users/never users) did not rise consistently with age. Relative risk may be underestimated due to changes of contraceptive method after entry and exclusion of those with labile hypertension at entry. "Actual increase in risk [may lie] somewhere between two and sixfold."</td></tr>
<tr><td>Ravenholt et al. 1977</td><td>153</td><td>Blood pressure readings were taken for 480 women who had not used OCs within preceding 3 months. Readings taken again after 3 cycles of OC use. 155 used Ovral® (norgestrel 0.5 mg + ethinyl estradiol (EE) 0.05 mg); 149, Norinyl® (norethindrone 1.0 mg + mestranol 0.05 mg); 154, Norlestrin® (norethindrone acetate 1.0 mg + EE 0.05 mg).</td><td>Mean blood pressure readings (systolic/diastolic):
<table>
<tr><th></th><th>Before Use</th><th>After 3 Cycles</th></tr>
<tr><td>Ovral</td><td>114.9/70.5</td><td>111.8/68.3</td></tr>
<tr><td>Norinyl</td><td>115.0/71.1</td><td>110.6/68.8</td></tr>
<tr><td>Norlestrin</td><td>116.9/70.6</td><td>113.3/68.7</td></tr>
</table></td></tr>
<tr><td>Royal College of General Practitioners 1977</td><td>168</td><td>Among OC users in the Royal College study were groups using three products, each with the same quantity of the same estrogen, but with varying quantities of the same progestin, norethisterone acetate. Occurrence of hypertension associated with the three products was compared.</td><td>
<table>
<tr><th>Progestin dose</th><th>Woman-years of observation</th><th>Incidence per 1,000 woman-years</th></tr>
<tr><td>1 mg</td><td>10,866</td><td>8.19</td></tr>
<tr><td>3 mg</td><td>13,821</td><td>12.30</td></tr>
<tr><td>4 mg</td><td>2,522</td><td>13.88</td></tr>
</table>
Trend is statistically significant ($p < 0.005$).</td></tr>
<tr><td>Weir et al. 1975</td><td>220</td><td>Cohort study, Glascow, Scotland (UK). Blood pressure changes over time were recorded for 235 users of oral contraceptives, 249 followed for 2–5 years, and compared with readings in 111 users of diaphragms or IUDs. Hypertension defined as pressure of 140/90 mm Hg or higher.</td><td>8 OC users showed hypertensive systolic readings; 2, hypertensive diastolic readings. No apparent clinical complications associated with blood pressure changes. Mean systolic and diastolic pressures rose significantly in users, particularly in first two years of use. No significant changes seen in controls.</td></tr>
</table>

Note: See also Table 12: Royal College of General Practitioners 1974 (167); Vessey et al. 1976 (213).

Table 18. Comparison of Vital Statistics Trends and OC Use, Selected Studies, 1968–1978

<table>
<tr><th>Author & Date</th><th>Ref. No.</th><th>Area</th><th>Rates Compared</th><th>Findings and Conclusions</th></tr>
<tr><td>Anderson 1970</td><td>6</td><td>Ontario, Canada</td><td>Changes between average rates for 1959–61 and for 1966–68 in females aged 15–44 compared with changes for males aged 15–44.</td><td>
<table>
<tr><th></th><th colspan="2">Percentage change</th></tr>
<tr><th></th><th>Females</th><th>Males</th></tr>
<tr><td>All circulatory system diseases</td><td>–11</td><td>–10</td></tr>
<tr><td>Venous thromboembolism</td><td>+200</td><td>+25</td></tr>
<tr><td>Cerebral thrombosis</td><td>+58</td><td>+17</td></tr>
<tr><td>Arteriosclerotic and other degenerative heart disease</td><td>+2</td><td>–8</td></tr>
</table>
</td></tr>
<tr><td>Belsey et al. 1978</td><td>19</td><td>Same as Beral 1976 (21) (see below)</td><td>For 3 ten-year age groups 15–44, period between 1955 and year of 1/3 peak OC use compared with years of peak use thereafter.</td><td>Circulatory system disease—11 trends were statistically significant: 4 adverse trends associated with growing OC usage in 15–24 and 25–34 age groups, 7 improvements in 35–44 age group. Countries with significant adverse trends had OC use rates below median for all countries.</td></tr>
<tr><td>Beral 1976</td><td>21</td><td>21 countries (16 European countries, USA, Canada, Australia, New Zealand, Japan)</td><td>For females aged 15–44, 1955–56 compared with 1961–62 and 1961–62 compared with 1971–72. For females aged 45–64 and for males aged 15–44, 1961–62 compared with 1971–72.</td><td>All non-rheumatic cardiovascular disease, non-rheumatic heart disease and hypertension, and cerebrovascular disease—mortality rate changes for women aged 15–44 generally correlated with the proportion of women estimated to be using OCs during the latter period, with largest percentage increase in rates taking place in areas with the highest proportion of OC users. Similar correlations were not observed for young women between 1955–56 and 1961–62, older women, or men. Trends in individual countries are not identified. Changes in per capita cigarette consumption were not correlated with changes in mortality rates nor with proportion using OCs.</td></tr>
<tr><td>Chow 1978</td><td>34</td><td>Taiwan</td><td>Females and males aged 20–49 in 5-year age groups, 1965–1976.</td><td>Cerebrovascular disease—No trends in disease mortality rates correlated significantly with trends in estimated OC use. Slight declines in rates in women after 1968, perhaps due to reduced fertility. No comparable declines in rates for men.
"The fact that the mortality rates from stroke among childbearing age women had not shown any significant upward trend after introduction of the oral contraceptive in 1967 is encouraging, suggesting, although not proving, that the pill probably had not had an overwhelming adverse effect on stroke mortality."</td></tr>
<tr><td>Frederiksen & Ravenholt 1970</td><td>62</td><td>USA</td><td>Females and males aged 20 and older in several age groups. Percentage increase between 1956–61 and between 1961–77 compared.</td><td>Thromboembolic disease—percent increase in mortality:
<table>
<tr><th></th><th colspan="2">1956–61</th><th colspan="2">1961–66</th></tr>
<tr><th>Age</th><th>Men</th><th>Women</th><th>Men</th><th>Women</th></tr>
<tr><td>20–34</td><td>48</td><td>40</td><td>22</td><td>77</td></tr>
<tr><td>35–44</td><td>6</td><td>17</td><td>65</td><td>134</td></tr>
<tr><td>20–44</td><td>20</td><td>28</td><td>47</td><td>105</td></tr>
<tr><td>44+</td><td>60</td><td>74</td><td>42</td><td>49</td></tr>
</table>
"It may be significant that, with the exception of the group 20–44 years of age, the increase was about the same for all age groups and for both sexes. In women in the age group 20–44 years, however, mortality due to thromboembolism increased more than twice as much as for men from 1961 to 1966, after oral contraceptives came into use." If the difference in rates is assumed to be due solely to OCs, "the excess mortality due to thromboembolism per annum is estimated at 3.6 deaths per 100,000 users of oral contraceptives 20–44 years of age."</td></tr>
<tr><td>Gram et al. 1976</td><td>68</td><td>Denmark</td><td>Females aged 15–49, 1955–72.</td><td>Thrombophlebitis, pulmonary infarction, and cerebral infarction combined—5-year moving average of number of deaths (not death rates) declined from about 15 per year in late 1950s to 11 per year in early 1960s, then rose. Rise moderated slightly after the introduction of OCs. "The introduction of [OCs] in Denmark in 1966 had no significant influence on the incidence of deaths from thromboembolic disease. . . ."</td></tr>
</table>

Table 18 (Continued)

Greene 1969	70	USA	Females aged 15–65, in 10-year age groups, compared with males, 1956–66.	**Intracerebral hemorrhage**—rates declined in both sexes, but in 1965–66 rate for females aged 25–34 was higher than that for males for first time. **Subarachnoid hemorrhage**—rates rose steadily and steeply in both sexes, but faster in females, except for the 15–24 year age group. "No explanation of this finding is readily available." **Cerebral embolism and thrombosis**—no definite trends in two lower age groups due to small numbers. Rates were stable for both sexes in three higher age groups. "An analysis of these data does not warrant any conclusions regarding the influence of [OCs] on cerebrovascular mortality."
Markush & Seigel 1969; **Seigel & Markush 1969**	119 181	USA USA	Females aged 15–64 in 5-year age groups. Trends for 1956–61 compared with those for 1962–66. Whites and other races analyzed separately. Changes in trends for females compared with those for males.	Data support hypothesis linking OCs and **diseases of veins**, but not OCs and **cerebral embolism and thrombosis** or **arteriosclerotic heart disease**. Estimating risk of death from diseases of veins for OC users relative to nonusers, 3–9.
Oliver 1974	134	England & Wales	Females aged 35–65, in 10-year age groups, 1950–70.	**Ischemic heart disease**—rates for all three age groups declined at the same increasing pace during the early 1950s. About 1958 the rate of decline became constant for all groups. By the early 1960s, rates for the 35–44 year age group began to rise at an increasing pace; between 1958 and 1970, the death rate rose more than 50%. Rates for the 45–54 year age group began rising in the mid-1960s. Declines in rate continued at a fairly steady pace in 55–64 year age group during the 1960s. Increased rate among young women "unexplained," but possibly due to more cigarette smoking.
Sartwell & Anello 1969	176	USA	White females aged 15–64, in 10-year age groups. Trends for 1956–61 compared with those for 1962–66. Changes in trends for females compared with those for males.	Data support hypothesis linking OCs and **venous thromboembolic diseases**, although some age groups show contrary trends. For **pulmonary embolism**, increases in rates were greater for females than for males in all but youngest age group, but differences were not statistically significant, perhaps due, in younger age groups, to small numbers.
Sartwell et al. 1976	178	USA	Females aged 15–54, in 10 year age groups, for periods 1961–63, 1964–66, 1967–69, and 1970–72, compared with those for males. Whites and other races examined separately.	**Pulmonary embolism**—in 15–24 and 25–34 year age groups, ratio of female to male rates rose sharply during 1964–66, then declined. No such pattern in the 35–44 year age group. In the 45–54 year age group, rates in females were slightly less than those in males. Findings "consistent with the view that OCs have somewhat increased female mortality from this condition." Fall in ratio for younger age groups after 1966 may be due to reduced estrogen dose in OCs or growing acceptance of predispositions to venous thromboembolism as contraindications to OC use.
Vessey & Weatherall 1968	216	England & Wales	Females aged 20–34 and 35–64, in 10-year age groups for 1953–67, compared with males.	**Thromboembolic disease**—rates for both sexes in 20–34 and 35–44 year age groups rose after 1962, but more quickly for females. In older age groups, rates for both sexes rose steadily, except for females aged 55–64, for whom increases slowed slightly after 1962. Trends compatible with hypothesis of link between OCs and thromboembolic disease.
Vessey & Inman 1973	214	England & Wales	As above (216), through 1971.	Trends compatible with hypothesis linking OC use and **thromboembolic disease**, but no evidence that rapid reduction in estrogen dose and lag in growth of OC use in 1970 lowered death rates.

Table 24. Birth Defects and Oral Contraceptive Use, Selected Cohort Studies, 1976–1978

			No. of Births studied				% of births			
Author & Date	Ref. No.	Study	Non-users	Users before pregnancy	Users during pregnancy	Births defects studied	Non-users	Former users	Users during pregnancy	Comment
Harlap & Davies 1978	73	Jerusalem Perinatal Study	13,630[a]	— 2,953 —	108	All malformations	7.66[a]	7.35	9.26	Pill users generally healthier than nonusers. Significantly high rates of Down's syndrome only in offspring of pill users of Asian origin ($p<0.05$) or of less than average weight-for-height ($p<0.01$). Users over age 35 at more risk than nonusers for Down's syndrome and other major malformations.
						Down's syndrome	0.18	0.33	0.92	
						Heart defects	0.40	0.20		
						Limb reduction	0.01	0.03		
						Neural tube defects	0.25	0.20	0.92	
Heinonen et al. 1977	75	Collaborative Perinatal Study	— 49,240 —		218	Cardiovascular defects	— 0.78 —		2.15	Adjusted relative risk: 2.4 (not statistically significant). However, there were 1.82% cardiovascular defects in 1,042 infants exposed in uterus to estrogen, progestin, or both, including OCs; relative risk: 2.3 ($p<0.05$).
Rothman & Louik 1978	164	Boston area survey	2,188[b]	3,087[c]	1,448[d]	All malformations	3.3[b]	3.6[c]	4.3[d]	No specific malformation showed association with OC use.
						Major malformations	0.55[b]	—	0.55[d]	
Royal College of General Practitioners 1976	171	Royal College	9,511	4,477	102	All congenital malformations	1.84	1.90	1.96	No specific malformation showed association with OC use.
			Special inquiry to physicians:				Special inquiry to physicians:			
			1,000	1,000	—		3.38	3.31	—	
Vessey et al. 1976	213	Oxford/ FPA study	Nulliparous, planned[e]:			All congenital malformations				"While our overall findings are reassuring . . ., we have as yet accumulated information about too few cases of each of the major types of malformations for individual examination." Only case of limb reduction defects was child of former diaphragm user.
			282/1	653	—		0.4/—[f]	3.8	—	
			Parous, planned[e]:							
			429/121[f]	484	—		4.0/2.5[f]	2.3	—	
			Nulliparous, unplanned[e]:							
			27/—	—	2		3.7/—[f]	—	—	
			Parous, planned[e]:							
			166/115	—	22		1.8/0.9[f]	—	4.5	

[a] No OC use since previous pregnancy
[b] No OC use within 3 years of conception
[c] OC use 1–12 months before conception
[d] OC use within one month of conception
[e] Singleton pregnancies only
[f] Ex-diaphragm/ex-IUD

BIBLIOGRAPHY

1. ANONYMOUS. Deaths among pill users in Britain. IPPF Medical Bulletin 11(5): 1-2. October 1977.

2. ANONYMOUS. Mortality rise associated with pill use appears to involve larger variety of circulatory diseases than believed earlier. Family Planning Perspectives 9(6): 278-280. November-December 1977.

3. AARSKOG, D. Intersex conditions masquerading as simple hypospadias. Birth Defects: Original Article Series 7(6): 122-130. May 1971.

4. ALKJAERSIG, N., FLETCHER, A., and BURSTEIN, R. Association between oral contraceptive use and thromboembolism: a new approach to its investigation based on plasma fibrinogen chromatography. American Journal of Obstetrics and Gynecology 122(2): 199-211. May 15, 1975.

5. AMBANI, L.M., JOSHI, N.J., VAIDYA, R.A., and DEVI, P.K. Are hormonal contraceptives teratogenic? Fertility and Sterility 28(8): 791-797. August 1977.

6. AMERICAN CANCER SOCIETY. 1978 cancer facts & figures. New York, American Cancer Society, 1977. 32 p.

7. ANDERSON, H.O. [Danish National Health Service, Board on Adverse Reactions to Drugs] Personal communication, November 14, 1978. 1 p.

8. ANDERSON, T.W. Oral contraceptives and female mortality trends. Canadian Medical Association Journal 102: 1156-1160. May 30, 1970.

9. ARMED FORCES INSTITUTE OF PATHOLOGY. HEPATIC BRANCH and CENTER FOR DISEASE CONTROL. BUREAU OF EPIDEMIOLOGY. FAMILY PLANNING EVALUATION DIVISION. Increased risk of hepatocellular adenoma in women with long-term use of oral contraceptives. Morbidity and Mortality Weekly Report 26(36): 293-294. September 9, 1977.

10. ARNTZENIUS, A.C., GENT, C.M. van, VOORT, H. van der, STEGERHOEK, C.I., and STYBLO, K. Reduced high-density lipoprotein in women aged 40-41 using oral contraceptives. Lancet 1(8076): 1222-1223. June 10, 1978.

11. ARTHES, F.G. and MASI, A.T. Myocardial infarction in younger women: associated clinical features and relationship to use of oral contraceptive drugs. Chest 70(5): 574-583. November 1976.

12. ASHCROFT, M.T., BEADNELL, H.M.S.G., BELL, R., and MILLER, G.J. Characteristics relevant to cardiovascular disease among adults of African and Indian origin in Guyana. Bulletin of the World Health Organization 42: 205-223. 1970.

13. BADARACCO, M.A. and VESSEY, M.P. Recurrence of venous thromboembolic disease and use of oral contraceptives. British Medical Journal 1(5901): 215-217. February 9, 1974.

14. BALL, A.P. and McKEE, P.A. Fibrin formation and dissolution in women receiving oral contraceptive drugs. Journal of Laboratory and Clinical Medicine 89(4): 751-762. April 1977.

15. BARNES, R.W., KRAPF, T., and HOAK, J.C. Erroneous clinical diagnosis of leg vein thrombosis in women on oral contraceptives. Obstetrics and Gynecology 51(5): 556-558. May 1978.

16. BARRON, B.A. and RICHART, R.M. An epidemiologic study of cervical neoplastic disease based on a self-selected sample of 7,000 women in Barbados, West Indies. Cancer 27(4): 978-986. April 1971.

17. BAUM, J.K., HOLTZ, F., BOOKSTEIN, J.J., and KLEIN, E.W. Possible association between benign hepatomas and oral contraceptives. Lancet 2(7835): 926-929. October 27, 1973.

18. BAYLET, B., FRAMENT, V. DUIP, S., BELINGA, N., and DEMEDEIROS, D. A study on the use of tobacco in native areas and urban environments in Senegal. Bulletin de la Societe Medical d'Afrique Noire de Langue Française 19(1): 36-40. 1974.

19. BELSEY, M.A., RUSSELL, Y., and KINNEAR, K. Cardiovascular disease and oral hormonal contraceptives: a reappraisal of vital statistics data. International Family Planning Perspectives and Digest (To be published)

20. BENGTSSON, C., RYBO, G., and WESTERBERG, H. Number of pregnancies, use of oral contraceptives and menopausal age in women with ischaemic heart disease, compared to a population sample of women. Acta Medica Scandinavica (Suppl. 549): 75-81. 1973.

21. BERAL, V. Cardiovascular-disease mortality trends and oral-contraceptive use in young women. Lancet 2(7994): 1047-1051. November 13, 1976.

22. BERAL, V., FRASER, P., and CHILVERS, C. Does pregnancy protect against ovarian cancer? Lancet 1(8073): 1083-1087. May 20, 1978.

23. BERAL, V. and KAY, C. Mortality in women on oral contraceptives. [Letter to the editor] Lancet 2(8051): 1276-1277. December 17, 1977.

24. BERAL, V., RAMCHARAN, S., and FARIS, R. Malignant melanoma and oral contraceptive use among women in California. British Journal of Cancer 36(6): 804-809. December 1977.

25. BERENDES, H. [Center for Population Research] [Walnut Creek study] Personal communication, November 16, 1978. 1 p.

26. BOLE, G.G., Jr., FRIEDLAENDER, M.H., and SMITH, C.K. Rheumatic symptoms and serological abnormalities induced by oral contraceptives. Lancet 1(7590): 323-326. February 15, 1969.

27. BOSTON COLLABORATIVE DRUG SURVEILLANCE PROGRAM. Oral contraceptives and venous thromboembolic disease, surgically confirmed gallbladder disease, and breast tumours. Lancet 1(7817): 1399-1404. June 23, 1973.

28. BOYCE, J.G., LU, T., NELSON, J.H., Jr., and FRUCHTER, R.G. Oral contraceptives and cervical carcinoma. American Journal of Obstetrics and Gynecology 128(7): 761-766. August 1, 1977.

29. BRACKEN, M.B., HOLFORD, T.R., WHITE, C., and KELSEY, J.L. Role of oral contraception in congenital malformations of offspring. Presented at the American Public Health Association Annual Meeting, Los Angeles, California, October 15-19, 1978. International Journal of Epidemiology be published)

30. BRADLEY, D.D., WINGERD, J., PETITTI, D.B., KRAUSS, R.M., and RAMCHARAN, S. Serum high-density-lipoprotein cholesterol in women using oral contraceptives, estrogens and progestins. New England Journal of Medicine 299(1): 17-20. July 6, 1978.

31. CARVALHO, A.C.A., VAILLANCOURT, R.A., CABRAL, R. B., LEES, R.S., and COLMAN, R.W. Coagulation abnormalities in women taking oral contraceptives. Journal of the American Medical Association 237(9): 875-878. February 28, 1977.

32. CHAN, C.K. and DETMER, D.E. Proper management of hepatic adenoma associated with oral contraceptives. Surgery, Gynecology and Obstetrics 144(5): 703-706. May 1977.

33. CHEN, P.C. Population and health policy in the People's Republic of China. Washington, D.C., Smithsonian Institution, Interdisciplinary Communications Program, December 1976. (Occasional Monograph Series No. 9) 157 p.

34. CHOW, L.P. Epidemiological study of oral contraceptive use and stroke among childbearing age women in Taiwan: prevalence of pill use and stroke mortality rates. Presented at the American Public Health Association Annual Meeting, Los Angeles, California, October 15-19, 1978. 18 p.

35. CHRISTOPHERSON, W.M., MAYS, E.T., and BARROWS, G. Hepatocellular carcinoma in young women on oral contraceptives. [Letter to the editor] Lancet 2(8079): 38-39. July 1, 1978.

36. CHULALONGKORN UNIVERSITY. POPULATION SURVEY DIVISION. The survey of fertility in Thailand. Country report. 2 vols. Bangkok, Thailand, 1977. (World Fertility Survey) 712 p.

37. CHUMNIJARAKIJ, T. Incidence of postpartum thromboembolism in Thai women: comparison with western experience. Journal of the Medical Association of Thailand 57(12): 592-594. December 1974.

38. CHUMNIJARAKIJ, T. and POSHYACHINDA, V. Postoperative thrombosis in Thai women. Lancet 1(7921): 1357-1358. June 21, 1975.

39. CLEZY, T.M., FOY, B.N., HODGE, R.L., and LUMBERS, E.R. Oral contraceptives and hypertension: an epidemiological survey. British Heart Journal 34: 1238-1243. 1972.

40. COLLABORATIVE GROUP FOR THE STUDY OF STROKE IN YOUNG WOMEN. Oral contraception and increased risk of cerebral ischemia or thrombosis. New England Journal of Medicine 288(17): 871-878. April 26, 1973.

41. COLLABORATIVE GROUP FOR THE STUDY OF STROKE IN YOUNG WOMEN. Oral contraceptives and stroke in young women: associated risk factors. Journal of the American Medical Association 23(7): 718-722. February 17, 1975.

42. COLLETTE, H.J.A., LINTHORST, G., and WAARD, F. de. Cervical carcinoma and the pill. [Letter to the editor] Lancet 1(8061): 441-442. February 25, 1978.

43. CORPORATION CENTRO REGIONAL DE POBLACION. Encuesta Nacional de Fecundidad, Colombia, 1976. Resultados generales. [National Fertility Study, Colombia, 1976. General results] [SP] Bogota, Colombia, 1978. (World Fertility Survey) 491 p.

44. CRANE, M.G., HARRIS, J.J., and WINSOR, W., 3rd. Hypertension, oral contraceptive agents, and conjugated estrogens. Annals of Internal Medicine 74: 13-21. January 1971.

45. DOMINICAN REPUBLIC. CONSEJO NACIONAL DE POBLACION Y FAMILIA. Encuesta Nacional de Fecundidad. Informe general. [National Fertility Study. General report][SP] Santo Domingo, October 1976. (World Fertility Survey) 611 p.

46. EDGREN, R.A. and STURTEVANT, F.M. Potencies of oral contraceptives. American Journal of Obstetrics and Gynecology 125(8): 1029-1038. August 15, 1976.

47. EDMONDSON, H.A., REYNOLDS, T.B., HENDERSON, B., and BENTON, B. Regression of liver cell adenomas associated with oral contraceptives. Annals of Internal Medicine 86(2): 180-182. February 1977.

48. EKBERG, J. [Aktiebolaget RECIP, Stockholm, Sweden] Personal communication, October 18, 1977. 1 p.

49. ECKHOLM, E. Cutting tobacco's toll. (Worldwatch paper 18) Washington, D.C., Worldwatch Institute, March 1978. 40 p.

50. EKROTH, L. [Swedish International Development Authority] [SIDA deliveries of oral contraceptives] Personal communication, November 14, 1978. 1 p.

51. ELEGBELEYE, O.O. and FEMI-PEARSE, D. Incidence and variables contributing to onset of cigarette smoking among secondary schoolchildren and medical students in Lagos, Nigeria. British Journal of Preventive and Social Medicine 30(1): 66-70. March 1976.

52. EPSTEIN, F. The epidemiology of coronary heart diesease. Journal of Chronic Diseases 18: 735-774. 1965.

53. FASAL, E. and PAFFENBARGER, R.S., Jr. Oral contraceptives as related to cancer and benign lesions of the breast. Journal of the National Cancer Institute 55(4): 767-773. October 1975.

54. FEARS, T.R., SCOTTO, J., and SCHNEIDERMAN, M.A. Skin cancer, melanoma, and sunlight. American Journal of Public Health 66(5): 461-464. May 1976.

55. FECHNER, R.E. Benign hepatic lesions and orally administered contraceptives: a report of seven cases and critical analysis of the literature. Human Pathology 8(3): 255-268. May 1977.

56. FECHNER, R.E. Influence of oral contraceptives on breast diseases. Cancer 39(6, Suppl.): 2764-2771. June 1977.

57. FIJI. BUREAU OF STATISTICS. Fiji Fertility Survey, 1974. Principal report. Sua, Fiji. December 1976. (World Fertility Survey) 563 p.

58. FISCH, I.R. and FRANK, J. Oral contraceptives and blood pressure. Journal of the American Medical Association 237(23): 2499-2503. June 6, 1977.

59. FISHER, R. I., NEIFIELD, J.P., and LIPPMAN, M.E. Oestrogen receptors in human malignant melanoma. Lancet 2(7981): 337-338. August 14, 1976.

60. FORD, K. Contraceptive utilization in the United States: 1973 and 1976. Advancedata, No. 36. United States. Department of Health, Education, and Welfare. Public Health Service. August 18, 1978. 12 p.

61. FREDERIKSEN, H. and RAVENHOLT, R.T. Oral contraceptives and thromboembolic disease. [Letter to the editor] British Medical Journal 4(5633): 770. December 21, 1968.

62. FREDERIKSEN, H. and RAVENHOLT, R.T. Thromboembolism, oral contraceptives, and cigarettes. Public Health Reports 85(3): 197-205. March 1970.

63. FUERTES-de la HABA, A., CURET CUEVAS, J.O., PELEGRINA, I., and BANGDIWALA, I. Deaths among users of oral and nonoral contraceptives. Obstetrics and Gynecology 36(4): 597-602. October 1970.

64. FUERTES-de la HABA, A., CURET, J.O., PELEGRINA, I., and BANGDIWALA, I. Thrombophlebitis among oral and non-oral contraceptive users. Obstetrics and Gynecology 38(2): 259-263. August 1971.

65. GILBERT, M., ROTSTEIN, J., CUNNINGHAM, C., ESTRIN, I., DAVIDSON, A., and PINCUS, G. Norethynodrel with mestranol in treatment of rheumatoid arthritis. Journal of the American Medical Association 190(3): 147. October-December 1964.

66. GORDON, T., CASTELLI, W.P., HJORTLAND, M.C., KANNEL, W.B., and DAWBER, T.R. High density lipoprotein as a protective factor against coronary heart disease: the Framingham Study. American Journal of Medicine 62: 707-714. 1977.

67. GRAM, L.F. [Danish National Health Service, Board on Adverse Reactions to Drugs] [Estimated number of users of oral contraceptives in Denmark, 1967-1976] Personal communication, March 29, 1977. 2 p.

68. GRAM, L.F., KOVACS, I., and PEDERSEN, A. Oral og intrauterine antikonception: forbrug og bivirkningen. [Oral and intrauterine contraceptives: use and adverse reactions][DA, summary in EN] Ugeskrift for Laeger 138(19): 1133-1139. May 3, 1976.

69. GREENBLATT, D.J. and KOCH-WESER, J. Oral contraceptives and hypertension. A report from the Boston Collaborative Drug Surveillance Program. Obstetrics and Gynecology 44(3): 412-417. September 1974.

70. GREENE, G.R. Trends in mortality from cerebrovascular diseases. In: United States. Food and Drug Administration. Advisory Committee on Obstetrics and Gynecology. Second report on the oral contraceptives. Washington, D.C., U.S. Government Printing Office, August 1, 1969. p. 41.

71. GREENE, G.R. and SARTWELL, P.E. Oral contraceptive use in patients with thromboembolism following surgery, trauma, or infection. American journal of Public Health 62(5): 680-685. May 1972.

72. GREIG, H.B.W. Oral contraceptives, anti-thrombin III and fibrinolytic activity in Africans. Acta Haematologica 58(3): 138-144. 1977.

73. HARLAP, S. and DAVIES, A.M. The pill and births: the Jerusalem study. Final report, January 1978. [Bethesda, Maryland, United States. Department of Health, Education, and Welfare. National Institute of Child Health and Development. Center for Population Research] 1978. 219 p.

74. HEIBY, J. The association of oral contraceptives and myocardial infarction in less developed countries. In: Sciarra, J., Zatuchni, G., and Speidel, J.J., eds. Risks, benefits, and controversies in fertility control. Hagerstown, Maryland, Harper and Row, 1978. p. 162-170.

75. HEINONEN, O.P., SLONE, D., MONSON, R.R., HOOK, E.B., and SHAPIRO, S. Cardiovascular birth defects and antenatal exposure to female sex hormones. New England Journal of Medicine 296(2): 67-70. 1977.

76. HERTZ, R. The problem of possible effects of oral contraceptives on cancer of the breast. Cancer 24: 1140-1145. December 1969.

77. HERTZ, R. Report of the task force on carcinogenesis: appendix 3. In: United States. Food and Drug Administration. Advisory Committee on Obstetrics and Gynecology. Second report on the oral contraceptive. Washington, D.C., U.S. Government Printing Office, August 1, 1969. p. 63-67.

78. HILL, A.B. Statistical evidence and inference. In: Hill, A.B. Principles of medical statistics. 9th edition. New York, Oxford University Press, 1971. p. 309-323.

79. HOOVER, R., BAIN, C., COLE, P., and MacMAHON, B. Oral contraceptive use: association with frequency of hospitalization and chronic disease risk indicators. American Journal of Public Health 68(4): 335-341. April 1978.

80. HORWITZ, R.I. and FEINSTEIN, A.R. Alternative analytic methods for case-control studies of estrogens and endometrial cancer. New England Journal of Medicine 299(20): 1089-1094. November 16, 1978.

81. IMS AMERICA, LTD. [Retail pharmacy purchases of oral contraceptives and components of oral contraceptives in the USA, study prepared for the Population Information Program] November 1977 and November 1978. 2 p.

82. IMS INTERNATIONAL, LTD. Retail pharmacy purchases of oral contraceptives. [Study prepared for the Population Information Program] October 1978. 1 p.

83. INMAN, W.H.W. and VESSEY, M.P. Investigation of deaths from pulmonary, coronary, and cerebral thrombosis and embolism in women of child-bearing age. British Medical Journal 2(5599): 193-199. April 27, 1968.

84. INMAN, W.H.W., VESSEY, M.P., WESTERHOLM, B., and ENGELUND, A. Thromboembolic disease and the steroidal content of oral contraceptives: a report to the Committee on Safety of Drugs. British Medical Journal 2(5703): 203-209. April 25, 1970.

85. INTER-SOCIETY COMMISSION FOR HEART DISEASE RESOURCES. Primary prevention of the atherosclerotic diseases. Circulation 42(6): A53-A95. December 1970.

86. JACOBS, H.S., KNUTH, U.A., HUIL, M.G.R., and FRANKS, S. Post-"pill" amenorrhea—cause or coincidence? British Medical Journal 2(8092): 940-942. October 8, 1977.

87. JAFFE, F.S. The pill: a perspective for assessing risks and benefits. New England Journal of Medicine 297(11): 612-614. September 15, 1977.

88. JAFFE, F.S. and OAKLEY, D. Observations on birth planning in China. Family Planning Perspectives 10(2): 101-108. March-April 1978.

89. JAIN, A.K. Mortality risk associated with the use of oral contraceptives. Studies in Family Planning 8(3): 50-54. March 1977.

90. JANERICH, D.T., DUGAN, J.M., STANDFAST, S.J., and STRITE, L. Congenital heart disease and prenatal exposure to exogenous sex hormones. British Medical Journal 1(6068): 1058-1060. April 23, 1977.

91. JANERICH, D.T., FLINK, E.M., and KEOGH, M.D. Down's syndrome and oral contraceptive usage. British Journal of Obstetrics and Gynecology 83(8): 617-620. August 1976.

92. JANERICH, D.T. and PIPER, J.M. Epidemiologic studies on the effect of oral contraceptives on subsequent pregnancies. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Risks, benefits, and controversies in fertility control. Hagerstown, Maryland, Harper and Row, 1978. p. 263-268.

93. JANERICH, D.T., PIPER, J.M., and GLEBATIS, D.M. Oral contraceptives and congenital limb-reduction defects. New England Journal of Medicine 291(14): 697-700. October 3, 1974.

94. JICK, H., DINAN, B., and ROTHMAN, K.J. Oral contraceptives and nonfatal myocardial infarction. Journal of the American Medical Association 239(14): 1403-1406. April 3, 1978.

95. JICK, H., PORTER, J., and ROTHMAN, K.J. Oral contraceptives and nonfatal stroke in healthy young women. Annals of Internal Medicine 89: 58-60. July 1978.

96. JOLY, D.J. Cigarette smoking in Latin America: a survey of eight cities. Bulletin of the Pan American Health Organization 9(4): 328-344. 1975.

97. JORDAN, W.M. Pulmonary embolism. [Letter to the editor] Lancet 2(7212): 1146-1147. November 18, 1961.

98. KAY, D.R., BOLE, G.G., and LEDGER, W.J. Antinuclear antibodies, rheumatoid factor and C-reactive protein in serum of normal women using oral contraceptives. Arthritis and Rheumatism 14(2): 239-248. March-April 1971.

99. KELSEY, J.L., HOLFORD, T.R., WHITE, C., MAYER, E.S., KILTY, S.E., and ACHESON, R.M. Oral contraceptives and breast disease: an epidemiological study. American Journal of Epidemiology 107(3): 236-244. March 1978.

100. KIRSCHNER, M.A. The role of hormones in the etiology of human breast cancer. Cancer 39(6, Suppl.): 2716-2726. June 1977.

101. KLINGER, A. Fertility and family planning in Hungary. Studies in Family Planning 8(7): 166-176. July 1977.

102. KLINGER, A. [Hungarian Central Statistical Office] Personal communication, November 9, 1977. 2 p.

103. KNOWLES, D.M., 2nd, CASARELLA, W.J., JOHNSON, P.M., and WOLFF, M. The clinical, radiologic, and pathologic characterization of benign hepatic neoplasms: alleged association with oral contraceptives. Medicine 57(3): 223-237. May 1978.

104. KOREA. ECONOMIC PLANNING BOARD. NATIONAL BUREAU OF STATISTICS. The Korean National Fertility Survey. First country report, 1974. Seoul, Korea, December 1977. (World Fertility Survey) 863 p.

105. KRAUSS, R.M., LINDGREN, F.T., SILVERS, A., JUTAGIR, R., and BRADLEY, D.D. Changes in serum high density lipoproteins in women on oral contraceptive drugs. Clinica Chimica Acta 80(3): 465-470. November 1, 1977.

106. KUNIN, C.M., McCORMACK, R.C., and ABERNATHY, J.R. Oral contraceptives and blood pressure. Archives of Internal Medicine 123: 362-365. April 1969.

107. LAWSON, D.H., DAVIDSON, J.F., and JICK, H. Oral contraceptive use and venous thromboembolism: absence of an effect of smoking. British Medical Journal 2(6089): 729-730. September 17, 1977.

108. LEELARASAMEE, A., ASWAPOKEE, N., MUANGMANEE, L., CHAROENLARP, K., and JAROONVESAMA, N. Prevalence of hypertension in Thai population in Bangkok. Journal of the Medical Association of Thailand 61(5): 301-307. May 1978.

109. LINOS, A., WORTHINGTON, J.W., O'FALLON, W.M., and KURLAND, L.T. Rheumatoid arthritis and oral contraceptives. [Letter to the editor] Lancet 1(8069): 871. April 22, 1978.

110. LiVOLSI, V.A., STADEL, B.V., KELSEY, J.L., HOLFORD, T.R., and WHITE, C. Fibrocystic breast disease in oral-contraceptive users: a histopathological evaluation of epithelial atypia. New England Journal of Medicine 299(8): 381-385. August 24, 1978.

111. MacMAHON, B. and PUGH, T.F. Epidemiology: principles and methods. Boston, Massachusetts, Little, Brown, 1970. 376 p.

112. MALAYSIA. DEPARTMENT OF STATISTICS. Malaysian Fertility and Family Survey, 1974. Kuala Lumpur, Malaysia, April 1977. (World Fertility Survey) 694 p.

113. MANN, J., MUNVOZ, J., and SCRIMSHAW, N. Serum lipoprotein and cholesterol concentrations of Central and North Americans with reference to dietary habits. American Journal of Medicine 19: 25-31. 1955.

114. MANN, J.I., DOLL, R., THOROGOOD, M., VESSEY, M.P., and WATERS, W.E. Risk factors for myocardial infarction in young women. British Journal of Preventive and Social Medicine 30(2): 94-100. June 1976.

115. MANN, J.I. and INMAN, W.H.W.. Oral contraceptives and death from myocardial infarction. British Medical Journal 2(5965): 245-248. May 3, 1975.

116. MANN, J.I., INMAN, W.H.W., and THOROGOOD, M. Oral contraceptive use in older women and fatal myocardial infarction. British Medical Journal 2(8033): 445-447. August 21, 1976.

117. MANN, J.I., THOROGOOD, M., WATERS, W.E., and POWELL, C. Oral contraceptives and myocardial infarction in young women: a further report. British Medical Journal 3(5984): 631-632. September 13, 1975.

118. MANN, J.I., VESSEY, M.P., THOROGOOD, M., and DOLL, R. Myocardial infarction in young women with special reference to oral contraceptive practice. British Medical Journal 2(5965): 241-245. May 3, 1975.

119. MARKUSH, R.E. and SEIGEL, D.G. Oral contraceptives and mortality trends from thromboembolism in the United States. American Journal of Public Health 59(3): 418-434. March 1969.

120. MARTIN, C.E. Marital and coital factors in cervical cancer. American Journal of Public Health 57(5): 803-814. May 1967.

121. MAY, D. Mortality associated with the pill. [Letter to the editor] Lancet 2(8044): 921. October 29, 1977.

122. MILLER, G. Cigarette smoking and irreversible airways obstruction in the West Indies. Thorax 29(5): 495-504. September 1974.

123. MILLER, N.W., FØRDE, O.H., THELLE, D.S., and MJØS, O.D. The Trømso Heart Study: high density lipoprotein and coronary heart-disease: a prospective case-control study. Lancet 1(8019): 965-968. 1977.

124. MORRISON, A.S., JICK, H., and ORY, H.W. Oral contraceptives and hepatitis. A report from the Boston Collaborative Drug Surveillance Program, Boston University Medical Center. Lancet 1(8022): 1142-1143. May 28, 1977.

125. NADIM, A., AMINI, H., and MALEK-AFZALI, H. Blood pressure and rural-urban migration in Iran. International Journal of Epidemiology 7(2): 131-138. June 1978.

126. NEILSON, G. and WILLIAMS, G. Blood pressure and valvular and congenital heart disease in Torres Strait Islanders. Medical Journal of Australia 1(Suppl. 1): 12-16. March 25, 1978.

127. NEPAL. MINISTRY OF HEALTH. FAMILY PLANNING AND MATERNAL HEALTH PROJECT. Nepal Fertility Survey, 1976. First report. Kathmandu, Nepal, His Majesty's Government, August 1977. (World Fertility Survey) 347 p.

128. NEWHOUSE, M.L., PEARSON, R.M., FULLERTON, J.M., BOESEN, E.A.M., and SHANNON, H.S. A case control study of carcinoma of the ovary. British Journal of Preventive and Social Medicine 31(3): 148-153. September 1977.

129. NORA, A.H. and NORA, J.J. Maternal exposure to exogenous progestogen/estrogen as a potential cause of birth defects. Advances in Planned Parenthood 12(3): 156-169. 1978.

130. NORA, A.H. and NORA, J.J. A syndrome of multiple congenital anomalies associated with teratogenic exposure. Archives of Environmental Health 30: 17-21. January 1975.

131. NORA, J.J. and NORA, A.H. Genetic and environmental factors in the etiology of congenital heart diseases. Southern Medical Journal 69: 919-926. 1976.

132. NORTMAN, D.L. and HOFSTATTER, E. Population and family planning programs (9th edition). New York, Population Council, 1978. 92 p.

133. OLIVER, M., ed. Coronary heart disease. Edinburgh, Churchill Livingstone, 1978. 261 p.

134. OLIVER, M.F. Ischaemic heart disease in young women. British Medical Journal 2(5939): 253-259. November 2, 1974.

135. ORY, H.W. Association between oral contraceptives and myocardial infarction: a review. Journal of the American Medical Association 237(24): 2619-2622. June 13, 1977.

136. ORY, H. W. The health effects of fertility control. Presented at the Symposium on Contraceptive Technology, National Academy of Sciences, Washington, D.C., May 19, 1978. 23 p.

137. PADMAVATI, S., GUPTA, S., and PANTULU, G. Dietary fat, serum cholesterol levels and incidence of atherosclerosis and hypertension in Delhi. Indian Journal of Medical Research 46: 245-260. 1958.

138. PAFFENBARGER, R.S., FASAL, E., SIMMONS, M.E., and KAMPERT, J.B. Cancer risk as related to use of oral contraceptives during fertile years. Cancer 39(4, Suppl.): 1887-1891. 1977.

139. PAGE, L., DAMON, A., and MOELLERING, R. Antecedents of cardiovascular disease in 6 Solomon Island societies. Circulation 49: 1132-1146. 1974.

140. PAKISTAN. POPULATION PLANNING COUNCIL. Population Fertility Survey, Pakistan, 1976. First report. Pakistan, 1976. (World Fertility Survey) 313 p.

141. PAKKALA, A.L. Living standard influences degree of cigarette smoking. Tobacco Reporter, July 1976. p. 55, 72.

142. PANAMA. OFICINADE ESTUDIOS DE POBLACION. Encuesta de fecundidad. Informe general, Panama, 1977. [Fertility study. General report. Panama, 1977][SP] Panama, November 1977. (World Fertility Survey) 485 p.

143. PERITZ, E., RAMCHARAN, S., FRANK, J., BROWN, W.L., HUANG, S., and RAY, R. The incidence of cervical cancer and duration of oral contraceptive use. American Journal of Epidemiology 106(6): 462-469. 1977.

144. PETITTI, D.B. and WINGERD, J. Use of oral contraceptives, cigarette smoking, and risk of subarachnoid hemorrhage. Lancet 2(8083): 234-235. July 29, 1978.

145. PETITTI, D.B., WINGERD, J., PELLEGRIN, F., and RAMCHARAN, S. Oral contraceptives, smoking, and other factors in relation to risk of venous thromboembolic disease. American Journal of Epidemiology 108(6): 480-485. December 1978.

146. POTTS, M., SPEIDEL, J.J., and KESSEL, E. Relative risks of various means of fertility control when used in less developed countries. In: Sciarra, J., Zatuchni, G., and Speidel, J.J., eds. Risks, benefits, and controversies in fertility control. Hagerstown, Maryland, Harper and Row, 1978. p. 17-51.

147. PRITCHARD, J.A. and PRITCHARD, S.A. Blood pressure response to estrogen-progestin oral contraceptive after pregnancy-induced hypertension. American Journal of Obstetrics and Gynecology 129(7): 733-739. December 1, 1977.

148. RAMCHARAN, S. [Walnut Creek study of OC use, sexual behavior, and cervical cancer] Personal communication, October 27, 1978. 1 p.

149. RAMCHARAN, S., PELLEGRIN, F.A., and HOAG, E. The occurrence and course of hypertensive disease in users and nonusers of oral contraceptive drugs. In: Fregly, M.J. and Fregly, M.S., eds. Oral contraceptives and high blood pressure. Gainesville, Florida, Dolphin, 1974. p. 1-16.

150. RAMCHARAN, S., PERITZ, E., PELLEGRIN, F.A., and WILLIAMS, W.T. Incidence of hypertension in the Walnut Creek Contraceptive Drug Study cohort. In: Garattini, S. and Berendes, H.W., eds. Pharmacology of steroid contraceptive drugs. New York, Raven, 1977. p. 277-288.

151. RAMSEUR, W.L. and COOPER, M.R. Asymptomatic liver cell adenomas: another case of resolution after discontinuation of oral contraceptive use. Journal of the American Medical Association 239(16): 1647-1648. April 21, 1978.

152. RAVENHOLT, R.T. World epidemiology and potential fertility impact of voluntary sterilization. Presented at the Third International Conference on Voluntary Sterilization, Tunis, February 1, 1976. 18 p.

153. RAVENHOLT, R.T., KESSEL, E., SPEIDEL, J.J., TALWAR, P.P., and LEVINSKI, M.J. A comparison of symptoms associated with the use of three oral contraceptives: a double-blind crossover study of Ovral, Norinyl, and Norlestrin. Advances in Planned Parenthood 12(4): 222-239. 1978.

154. RAVENHOLT, R.T. and RINEHART, W. Age-specific mortality trends in the United States relative to use of oral contraceptives. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Risks, benefits, and controversies in fertility control. Hagerstown, Maryland, Harper and Row, 1978. p. 17-27.

155. RAVENHOLT, R.T. and RINEHART, W. Mortality from circulatory system disease in four countries. January 1978. 24 p. (Unpublished)

156. RHOADS, G.G., GULBRANDSEN, C.L., and KAGAN, A. Serum lipoproteins and coronary heart disease in a population study of Hawaii Japanese men. New England Journal of Medicine 294(6): 293-298. February 5, 1976.

157. RINEHART, W. and FELT, J.C. Debate on oral contraceptives and neoplasia continues; answers remain elusive. Population Reports, Series A, No. 4. Washington, D.C., Population Information Program, May 1977. 34 p.

158. ROSENBERG, L., ARMSTRONG, B., and JICK, H. Myocardial infarction and estrogen therapy in premenopausal women. [Letter to the editor]. New England Journal of Medicine 294(23): 1290-1291. June 3, 1976.

159. ROSENBERG, L., ARMSTRONG, B., and JICK, H. Myocardial infarction and estrogen therapy in post-menopausal women. New England Journal of Medicine 294(23): 1256-1259. June 3, 1976.

160. ROSENBERG, L., HENNEKENS, C.H., ROSNER, B., BELANGER, C., and SPEIZER, F.E. A case-control study of oral contraceptive use and non-fatal myocardial infarction in American women. [Abstract only] American Journal of Epidemiology 106(3): 252. September 1977.

161. ROSENFIELD, A. Oral and intrauterine contraception: a 1978 risk assessment. American Journal of Obstetrics and Gynecology 132: 92-106. September 1, 1978.

162. ROTHMAN, K.J. Fetal loss, twinning and birth weight after oral-contraceptive use. New England Journal of Medicine 297(9): 468-471. September 1, 1977.

163. ROTHMAN, K.J. and LIESS, J. Gender of offspring after oral-contraceptive use. New England Journal of Medicine 295(16): 859-861. October 14, 1976.

164. ROTHMAN, K.J. and LOUIK, C. Oral contraceptives and birth defects. New England Journal of Medicine 299(10): 522-524. September 7, 1978.

165. ROTKIN, I.D. A comparison review of key epidemiological studies in cervical cancer related to current searches for transmissible agents. Cancer Research 33: 1353-1367. June 1973.

166. ROYAL COLLEGE OF GENERAL PRACTITIONERS. RECORDS UNIT AND RESEARCH ADVISORY SERVICE. Oral contraception and thrombo-embolic disease. Journal of the Royal College of General Practitioners 13: 267-279. 1967.

167. ROYAL COLLEGE OF GENERAL PRACTITIONERS. Oral contraception and health: an interim report from the oral contraception study of the Royal College of General Practitioners. New York, Pitman, 1974. 100 p.

168. ROYAL COLLEGE OF GENERAL PRACTITIONERS' ORAL CONTRACEPTION STUDY. Effect on hypertension and benign breast disease of progestagen component in combined oral contraceptives. Lancet 1(8012): 624. March 19, 1977.

169. ROYAL COLLEGE OF GENERAL PRACTITIONERS' ORAL CONTRACEPTION STUDY. Mortality among oral-contraceptive users. Lancet 2(8041): 727-731. October 8, 1977.

170. ROYAL COLLEGE OF GENERAL PRACTITIONERS' ORAL CONTRACEPTION STUDY. Oral contraceptives, venous thrombosis, and varicose veins. Journal of the Royal College of General Practitioners 28(192): 393-399. July 1978.

171. ROYAL COLLEGE OF GENERAL PRACTITIONERS' ORAL CONTRACEPTION STUDY. The outcome of pregnancy in former oral contraceptive users. British Journal of Obstetrics and Gynaecology 83(8): 608-616. August 1976.

172. ROYAL COLLEGE OF GENERAL PRACTITIONERS' ORAL CONTRACEPTION STUDY. Reduction in incidence of rheumatoid arthritis associated with oral contraceptives. Lancet 1(8069): 569-571. March 18, 1978.

173. RYDER, N.B. Contraceptive failure in the United States. Family Planning Perspectives 5: 133-144. Summer 1973.

174. SADOFF, L., WINKLEY, J., and TYSON, S. Is malignant melanoma an endocrine-dependent tumor. Oncology 27: 244-257. 1973.

175. SAGAR, S., STAMATAKIS, J.D., THOMAS, D.P., and KAKKAR, V.V. Oral contraceptives, antithrombin-III activity, and postoperative deep-vein thrombosis. Lancet 1(7958): 509-511. March 6, 1976.

176. SARTWELL, P.E. and ANELLO, C. Trends in mortality from thromboembolic disorders. In: United States. Food and Drug Administration. Advisory Committee on Obstetrics and Gynecology. Second report on the oral contraceptives. Washington, D.C., U.S. Government Printing Office, August 1, 1969. p. 37-40.

177. SARTWELL, P.E., MASI, A.T., ARTHES, F.G., GREENE, G.R., and SMITH, H.E. Thromboembolism and oral contraceptives: an epidemiologic case-control study. American Journal of Epidemiology 90(5): 365-380. 1969.

178. SARTWELL, P.E., STOLLEY, P.D., TONASCIA, J.A., TOCKMAN, M.S., RUTLEDGE, A.H., and WERTHEIMER, D. Overview: pulmonary embolism mortality in relation to oral contraceptive use. Preventive Medicine 5(1): 15-19. March 1976.

179. SCHONLAND, M. and BRADSHAW, E. Smoking patterns in Africans and Indians of Natal. International Journal of Cancer 4(5): 743-751. September 1969.

180. SCRIMSHAW, N., TRULSON, M., TEJADA, C., HEZSTED, D., and STARE, F. Serum lipoprotein and cholesterol concentrations. Comparison of rural Costa Rican, Guatemalan, and United States populations. Circulation 15: 805-812. 1957.

181. SEIGEL, D.G. and MARKUSH, R.E. Oral contraceptives and relative risk of death from venous and pulmonary thromboembolism in the United States. American Journal of Epidemiology 90(1): 11-16. 1969.

182. SHAPER, A.G. Cardiovascular disease in the tropics—III, blood pressure and hypertension. British Medical Journal 3(5830): 805–807. September 30, 1972.

183. SHAPER, A.G. Cardiovascular disease in the tropics—IV, coronary heart disease. British Medical Journal 4(5831): 32–35. October 7, 1972.

184. SHAPER, A.G., HUTT, M.S.R., and FEJFAR, Z., eds. Cardiovascular disease in the tropics. London, British Medical Association, 1974. 394 p.

185. SPEIDEL, J.J. and McCANN, M.F. Mini-laparotomy—a fertility control technology of increasing importance. Advances in Planned Parenthood 13(2). (In press)

186. SHELTON, J.D. and PETITTI, D. Formulation-dependent effect of oral contraceptives on H.D.L.-cholesterol. [Letter to the editor] Lancet 2(8091): 677. September 23, 1978.

187. SPELLACY, W.N. and BIRK, S.A. The effect of intrauterine devices, oral contraceptives, estrogens, and progestogens on blood pressure. American Journal of Obstetrics and Gynecology 112(7): 912-919. April 1, 1972.

188. SPENCER, J.D., MILLIS, R.R., and HAYWARD, J.L. Contraceptive steroids and breast cancer. British Medical Journal 1(6119): 1024-1026. April 22, 1978.

189. SPONZILLI, E.E., RAMCHARAN, S., and WINGERD, J. Rheumatoid factor (antigammaglobulin) in women. Arthritis and Rheumatism 19(3): 602-606. May-June 1976.

190. SRI LANKA. MINISTRY OF PLAN IMPLEMENTATION. DEPARTMENT OF CENSUS AND STATISTICS. World Fertility Survey, Sri Lanka, 1975. First report. Sri Lanka, March 1978. (World Fertility Survey) 713 p.

191. STERN, E., FORSYTHE, A.B., and COFFELT, C.F. Steroid contraceptive use and cervical dysplasia: increased risk of progression. Science 196(4297): 1460-1462. June 24, 1977.

192. STOLLEY, P.D., TONASCIA, J.A., TOCKMAN, M.S., SARTWELL, P.E., RUTLEDGE, A.H., and JACOBS, M.P. Thrombosis with low-estrogen oral contraceptives. American Journal of Epidemiology 102(3): 197-208. September 1975.

193. TALALAK, P. Thromboembolism in Thailand: incidence, coagulogram and its significance in therapeutic implication and prognosis. Journal of the Medical Association of Thailand 59(1): 6-11. January 1976.

194. TARZY, B.J., GARCIA, C.-R., WALLACH, E.E., ZWEIMAN, B., and MYERS, A.R. Rheumatic disease, abnormal serology, and oral contraceptives. Lancet 2(7776): 501-503. September 9, 1972.

195. THOMAS, W.A., DAVIES, J.N., O'NEAL, R.M., and DIMAKULANGAN, A.A. Incidence of myocardial infarction correlated with venous and pulmonary thrombosis and embolism. A geographic study based on autopsies in Uganda, East Africa, and St. Louis, U.S.A. American Journal of Cardiology 5: 41-47. January 1960.

196. TIETZE, C. New estimates of mortality associated with fertility control. Family Planning Perspectives 9(2): 74-76. March/April 1977.

197. TIETZE, C. What price fertility control? Lower than that of unwanted pregnancy. Contemporary Ob/Gyn 12: 32–37. July 1978.

198. TIETZE, C., BONGAARTS, J., and SCHEARER, B. Mortality associated with the control of fertility. Family Planning Perspectives 8(1): 6–14. January–February 1976.

199. TIETZE, C. and LEWIT, S. Life risks associated with reversible methods of fertility regulation. Presented at the International Symposium on a Reappraisal of Fertility Control: Benefits vs. Risks, Montreal, September 12-13, 1978. 12 p.

200. TORRES, A. Organized family planning services in the United States, 1968–1976. Family Planning Perspectives 10(2): 83–88. March–April 1978.

201. UNITED NATIONS. WORLD HEALTH ORGANIZATION (WHO). Steroid contraception and the risk of neoplasia. Report of a WHO Scientific Group. Geneva, 1978. (WHO Technical Report Series 619) 54 p.

202. UNITED NATIONS. WORLD HEALTH ORGANIZATION. World health statistics annual, 1960–1975. Vol. 1. Vital statistics and causes of death. Geneva, 1963–1976.

203. UNITED STATES. AGENCY FOR INTERNATIONAL DEVELOPMENT. OFFFICE OF POPULATION. Personal communication, November 15, 1978. 2 p.

204. UNITED STATES. AGENCY FOR INTERNATIONAL DEVELOPMENT. OFFICE OF POPULATION. Family planning service statistics, annual report, 1976. Washington, D.C. 1977. 150 p.

205. UNITED STATES. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. FOOD AND DRUG ADMINISTRATION. Oral contraceptive labelling. FDA Drug Bulletin 8(2): 12–13. March–April 1978.

206. UNITED STATES. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. FOOD AND DRUG ADMINISTRATION. Risk of myocardial infarction in users of oral contraceptives. FDA Drug Bulletin 5(3): 10. July–August 1975.

207. UNITED STATES. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. NATIONAL CENTER FOR HEALTH STATISTICS. Vital statistics of the United States, 1951–1975. Vol. 2. Mortality. Washington, D.C., U.S. Government Printing Office, 1954–1977.

208. UNITED STATES. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. PUBLIC HEALTH SERVICE. Adult use of tobacco—1975. Washington, D.C., June 1976. 23 p.

209. URAGODA, C.G. and SENEWIRATNE, B. Tobacco smoking in Ceylon. Journal of Tropical Medicine and Hygiene 74: 145-147. July 1971.

210. VAUGHN, J.P. A review of cardiovascular diseases in developing countries. Annals of Tropical Medicine and Parasitology 72(2): 101-109. April 1978.

211. VESSEY, M.P. and DOLL, R. Investigation of relation between use of oral contraceptives and thromboembolic disease. British Medical Journal 2(5599): 199-205. April 27, 1968.

212. VESSEY, M.P. and DOLL, R. Investigation of relation between use of oral contraceptives and thromboembolic disease. A further report. British Medical Journal 2(5658): 651–657. June 14, 1969.

213. VESSEY, M., DOLL, R., PETO, R., JOHNSON, B., and WIGGINS, P. A long-term follow-up study of women using different methods of contraception—an interim report. Journal of Biosocial Science 8(4): 375–427. October 1976.

214. VESSEY, M.P. and INMAN, W.H.W. Speculations about mortality trends from venous thromboembolic disease in England and Wales and their relation to the pattern of oral contraceptive usage. Journal of Obstetrics and Gynaecology of the British Commonwealth 80(6): 548–552. June 1973.

215. VESSEY, M.P., McPHERSON, K., and JOHNSON, B. Mortality among women participating in the Oxford/Family Planning Association contraceptive study. Lancet 2(8041): 731-733. October 8, 1977.

216. VESSEY, M.P. and WEATHERALL, J.A.C. Venous thromboembolic disease and the use of oral contraceptives: a review of mortality statistics in England and Wales. Lancet 2(7559): 94–96. July 13, 1968.

217. VESSEY, M.P. and MANN, J.I. Female sex hormones and thrombosis: epidemiological aspects. British Medical Bulletin 34(2): 157-162. 1978.

218. VESSEY, M.P., WRIGHT, N.H., McPHERSON, K., and WIGGINS, P. Fertility after stopping different methods of contraception. British Medical Journal 1(6108): 265-267. February 4, 1978.

219. VORSTER, D.J.M., ed. The human biology of environmental change. London, International Biological Programme, 1972. 205 p.

220. WEIR, R.J., DAVIES, D.L., FRASER, R., MORTON, J.J., TREE, M., and WILSON, A. Contraceptive steroids and hypertension. Journal of Steroid Biochemistry 6(6): 961-964. June 1975.

221. WESTOFF, C.F. and JONES, E.F. Contraception and sterilization in the United States, 1965-1975. Family Planning Perspectives 9(4): 153-157. July-August 1977.

Erratum

In **Population Reports** J-20, "Filling Family Planning Gaps" (September 1978), the authors' names in references 71-73 were inadvertantly transposed. Corrected, the references read:

ZELNIK, M. and KANTNER, J.F., Contraceptive patterns and pregnancy among women aged 15-19 in 1976. Family Planning Perspectives 10(3): 135-142. May-June 1978.

ZELNIK, M. and KANTNER, J.F., First pregnancies to women aged 15-19: 1976 and 1971. Family Planning Perspectives 10(1): 11-20. January-February 1978.

ZELNIK, M. and KANTNER, J.F., Sexual and contraceptive experience of young, unmarried women in the United States, 1976 and 1971. Family Planning Perspectives 9(2): 55-71. March-April 1977.

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ISSUES IN WORLD HEALTH

Population Information Program, Johns Hopkins University, Hampton House, 624 North Broadway, Baltimore, Maryland 21205, USA

Tobacco — Hazards to Health and Human Reproduction

Summary. The use of tobacco is one of the foremost public health problems in the world today. In the developed countries, tobacco-related disease subtracts 5 to 10 years from the life of the average male smoker. Tobacco also adversely affects the outcome of some pregnancies. In developed countries public recognition of the danger is beginning to discourage smoking, especially among the better-educated. In the developing countries, however, there has been little attention to the hazards of smoking, and tobacco consumption has been increasing by about 5 percent annually. Governments have found it difficult to adopt vigorous, health-oriented tobacco policies partly because of the substantial export and tax revenues derived from tobacco. Nevertheless, health professionals should be aware of the full range of risks associated with tobacco. Especially those who work in maternal and child health and family planning should understand the dangers that tobacco poses for the reproductive process and for infants and children so that they can educate prospective parents to these dangers.

The impact of tobacco on health has been amply documented. As the 1979 report of the US Surgeon General on smoking and health confirms, the death rates of US men who smoke cigarettes are about 10 times higher for lung cancer, 5 times higher for bronchitis, emphysema, and asthma, and 2 to 3 times higher for heart disease than of men who do not smoke. The risk of death is somewhat lower for pipe and cigar smokers, for those who do not inhale, for those who use filter cigarettes, and for women, but for all smokers the risk of death increases progressively with the amount smoked. In the developing countries, the long-term costs of tobacco use are just beginning to be apparent, although the link between tobacco use and morbidity and mortality has long been recognized — for example, the relationship of chewing tobacco and oral cancer in India.

In the developed countries, twenty years of publicity about the dangers of smoking are beginning to have some effects in reducing smoking. Between 1964, when the first US Surgeon General's report on smoking and health was released, and 1975 the percentage of males smoking declined from 52 to 39 and the percentage of females dropped from 34 to 29. Among US male college graduates the percentage of smokers fell from 42.5 to 28.1 between 1964 and 1975. In Britain surveys of 60,000 male physicians showed that between 1951 and 1965 half gave up smoking. As a result death rates of physicians for tobacco-related diseases dropped sharply below the death rates of the male population as a whole.

In the developing world, opposite trends seem to be at work. Smoking is a symbol of modernism, Western ways, and affluence — as tobacco advertising constantly emphasizes — appealing to the educated elites in the cities and to those with some cash income. Smoking is on the increase among university students, including those at medical schools. At the University of Lagos, for example, in 1976 nearly three-quarters of male medical students and one-quarter of female students described themselves as tobacco users. The expanding markets of the developing countries, where there are few restrictions on sales, promotion, and advertising, look increasingly attractive to tobacco companies which face ever more regulation and restriction in the developed countries. While the worldwide manufacture of Western-style cigarettes is growing, in rural or poor populations home-grown tobacco, potent leaf-wrapped or hand-rolled cigarettes, pipe tobacco, chewing tobacco, and other mixtures remain popular among women as well as men.

Use of Tobacco during Pregnancy

Although much of the early research on tobacco dealt with adult males, the fact that young women are smoking in larger numbers is focussing more attention on the impact of smoking upon the process of human reproduction and specifically upon the development of the fetus and the infant. In general, that impact is adverse. Smoking during pregancy is associated with:

- lower birth weights
- shortened gestation
- higher rates of spontaneous abortion, especially during the last months of pregnancy
- more frequent complications of pregnancy and labor
- and, most important, higher rates of perinatal mortality.

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Phyllis T. Piotrow, Ph.D., Director; Helen K. Kolbe, M.S., Co-Director; Ward Rinehart, Editor.

For a healthy, well-nourished woman in her 20s who smokes in moderation and has access to good medical care, the additional risk of a stillbirth or infant death attributable to smoking is small, probably no more than 10 to 20 percent greater than for a nonsmoker. By contrast, for a heavy smoker who is older, poor, or anemic, the risk of losing her baby may be as much as 100 percent higher. In Bangladesh, for example, among women with no formal education and low hemoglobin levels, perinatal mortality was twice as high among smokers as among nonsmokers. Although the exact manner in which tobacco affects birth weight, perinatal mortality, and other aspects of pregnancy is not clear, researchers suspect that carbon monoxide or nicotine or both are responsible.

Even after birth, the infants of mothers who smoke may face additional problems. Some studies have found evidence of increased congenital abnormalities among these infants, including cardiovascular changes that might lead to later coronary disease. If mothers who breast-feed smoke, their infants will imbibe nicotine and possibly more DDT, with unknown consequences. Infants in families where one or both parents smoke are more likely to develop bronchitis and pneumonia during the first year of life. The danger of Sudden Infant Death Syndrome (SIDS) is also suspected to be greater in families where the mother smokes.

Some effects may persist into childhood. For example, the children of British mothers who smoked were found to be about one centimeter shorter than the children of nonsmokers. More important, they scored slightly lower in reading, mathematics, and "general ability" tests than the children of nonsmokers. But it is hard to prove that smoking alone caused such differences.

Government Restrictions

As the public recognizes some if not all of these dangers, governments in the developed countries have been placed under growing pressure over the last two decades to take action, and now they are gradually beginning to do so. Policy changes in this area do not come easily, however. In the US, for example, efforts to promote anti-smoking policy by the American Cancer Society, the Surgeon General, many health professionals, and now many of those who have stopped smoking are opposed by tobacco growers, tobacco manufacturers, advertisers, media dependent on tobacco advertising, retail distributors, and some individual smokers. Tax revenues of about $6 billion contribute to government reluctance to act.

As of 1974, 20 of 25 developed countries surveyed had taken some regulatory action against smoking as compared with only 13 of 49 developing countries. Since then many have increased taxes and a few have imposed stricter regulations. Finland, Norway, and Sweden among the developed countries and Singapore among the developing countries have probably gone furthest to institute anti-smoking policies. This means moving "from an implicit tobacco policy serving predominantly commercial and fiscal interests towards an explicit health-oriented smoking control policy" (137). Of international agencies, the World Health Organization (WHO) has taken the initiative in pointing out the health hazards of smoking and in recommending vigorous governmental anti-smoking policies.

Among the actions governments could take to implement "a health-oriented smoking control policy" would be:

- expanding research
- undertaking public education campaigns
- raising taxes, especially on high tar and nicotine products
- establishing government standards for production
- reducing export subsidies
- eliminating agricultural extension and government support services
- requiring health warnings and contents labelling on tobacco products and advertising
- limiting or prohibiting advertising
- limiting sales, e.g., to minors or in certain areas
- prohibiting smoking in public areas and in work places
- setting differential life insurance rates for smokers

No government has yet adopted the whole gamut of actions that would constitute a "health-oriented" tobacco policy, but there is ample opportunity for health professionals to move in that direction. Working from maternal and child health centers and in clinic or community-based family planning programs around the world, health professionals and community leaders are in constant touch with fertile couples and families. They could help all these families to reduce infant mortality, to improve the conditions of reproduction, and to protect the development of the next generation by discouraging the spread of a pernicious habit. **End of summary.**

> **"There is a real danger of this deadly habit being exported to the younger countries of Africa and Asia, and the Western World has a responsibility to see that this is not done. . . . We have already produced millions of slaves to cigarettes in our own land. To export this slavery to the developing countries would be very wrong."**
>
> **Editorial**
> **British Medical Journal**
> **October 9, 1971**

TOBACCO, HEALTH, AND MORTALITY

Strong scientific evidence of the health hazards of smoking tobacco began to appear in the 1920s and 1930s when health personnel and statisticians noted both an increase in male rates of death from lung cancer and a large proportion of smokers among men who developed lung cancer (13, 240). In 1938, one of the first American demographers, Raymond Pearl, then at the Johns Hopkins School of Hygiene and Public Health, published a study of tobacco use and longevity based on life tables of 6,813 white males (196) (see box, p. L-5). Among men between the ages of 30 and 50, age-specific death rates for all causes were approximately twice as high for heavy smokers as for nonsmokers, and at each age fewer smokers than nonsmokers survived (see Figure 1).

Lung Cancer

Although greeted at first with skepticism, these findings were reinforced in the 1950s and 1960s by an increasing number of US, British, Canadian, and Japanese case-comparison (or retrospective) and cohort (or prospective) studies that identified not only a direct association between smoking and lung cancer but also a dose-response effect: death rates increased proportionately with the average number of cigarettes smoked daily (27, 36, 56, 57, 99, 100, 112, 122, 268). Animal studies substantiated these results. The epidemiologic studies showed mortality rate ratios for males ranging from approximately 2:1 to 10:1 for light cigarette smokers compared with nonsmokers and up to more than 20:1 for heavy smokers. The mortality ratios are lower for pipe and cigar smokers (27, 56, 57, 99, 100, 122), for women (99), for those who do not inhale, for those smoking filtered cigarettes, and for ex-smokers, whose risks diminish as time since they quit elapses (257).

One of the strongest pieces of evidence linking smoking and death comes from a study of nearly 60,000 British physicians (56, 57). Not only did those who smoked die earlier, but also those who gave up the habit had nearly normal life spans. Between 1951 and 1956, about half of the 43 percent of the doctors who had been cigarette smokers gave up the habit. Between 1953-57 and 1961-65 lung cancer death rates for the male population as a whole (of whom nearly half were smokers) increased by 7 percent whereas the death rates for the male physicians fell by 38 percent (56, 57, 214).

In the United States, as Table 1 shows, lung cancer death rates increased about fivefold between 1945 and 1975, creating what the Public Health Service has described as "an alarming epidemic" (257). These mortality trends, together with cohort and case-comparison data and animal studies, "confirm the conclusion that cigarette smoking is the main cause of lung cancer in men" (257). In the next decade lung cancer will exceed breast cancer as the major cause of deaths from cancer in US women (259).

Tobacco use increases the risk of other cancers as well, especially in tissues that come into contact with tobacco particles and smoke. Risks of dying from cancer of the larynx, for example, are 6 to 10 times higher for cigarette smokers than for nonsmokers (257); risks of dying from cancer of the esophagus, 2 to 6 times higher. Case-comparison studies have estimated the risk of death from bladder cancer to smokers to be twice as high as to nonsmokers, and large-scale cohort studies show that this heightened risk is dose-related (214). Other sites subject to higher risk of cancer from smoking or chewing tobacco include the pharynx, the oral cavity, the pancreas, the kidney (218, 257), and possibly the uterine cervix (270).

Lung cancer was the first disease to be clearly associated with smoking tobacco, and the 10:1 ratio of mortality rates for smokers compared with nonsmokers is higher than for any other major cause of death associated with tobacco use. Cohort studies have shown, however, that only about 15 percent of the total excess mortality among smokers can be attributed to lung cancer. The rest is caused by increased rates of coronary heart disease, chronic respiratory ailments, other cancers, and miscellaneous other causes of death (27, 56, 57, 99, 205).

Heart Disease

Diseases of the heart are a major cause of death in the industrialized countries. More Americans now die from heart disease than from any other ailment and almost ten times as many as from lung cancer (see Table 1). In the United Kingdom, heart disease accounts for about one-third of deaths among men between the ages of 35 and 64 (214). Numerous case-comparison and cohort studies have confirmed that cigarette smokers have significantly higher rates of death from coronary heart disease than nonsmokers, and that here too the risk increases with the number of cigarettes smoked (27, 56, 57, 100, 112, 122, 123, 213). In the absence of other predisposing factors, such as high serum cholesterol levels, high blood pres-

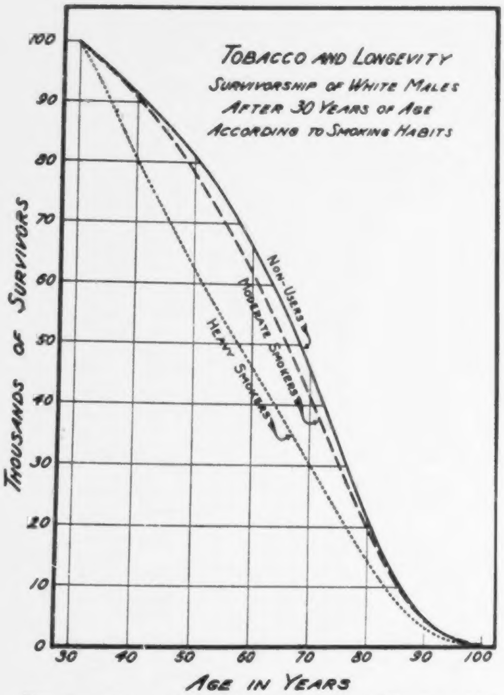

FIG. 1. The survivorship lines of life tables for white males falling into three categories relative to the usage of tobacco. A. Non-users (solid line); B. Moderate smokers (dash line); C. Heavy smokers (dot line).

Figure 1. Raymond Pearl's 1938 study of US men showed that fewer smokers than nonsmokers survived to every age between 30 and 70.

Source: Pearl (196)

Table 1. United States Mortality Rates for Selected Diseases, 1905-1975 (per 100,000 population)

Cause of death	Year							
	1905	1915	1925	1935	1945	1955	1965	1975
All causes	1,588.9	1,317.6	1,168.1	1,094.5	1,058.1	930.4	943.2	896.1
Tuberculosis, all forms	179.9	140.1	84.8	55.1	39.9	9.1	4.1	1.6
Malignant neoplasms of the respiratory system				4.9	10.4	18.2	27.7	40.7
Cancers of lung, pleura, bronchus & trachea								
Male						28.0	43.0	61.1
Female						5.0	7.7	17.0
Total		0.7	1.7	3.4	6.2	16.3	25.0	38.5
Diseases of the heart								
Male	167.4	168.6	195.9	277.0	400.1	425.8	435.3	385.2
Female	156.5	158.9	173.4	213.3	248.7	289.0	303.2	289.7
Total	161.9	163.9	184.8	245.4	320.3	356.5	368.0	336.2
Diseases of the respiratory system	202.0	159.9	107.5	93.2	54.4	38.2	51.6	52.6
Pneumonia	112.3	81.3	43.2	48.5	22.2	25.4	30.8	24.1
Bronchitis, emphysema & asthma*								
Male							24.3	31.6
Female							4.6	10.1
Total	35.7	20.1	8.3	4.7	4.5	7.7	14.9	20.6

Note: Because of international reclassifications of causes of death occurring each decade, mortality rates are not strictly comparable over long periods of time. Between the Fifth Revision, covering 1939-1948, and the Sixth Revision, covering 1949-1960, comparability of both lung cancer and bronchitis, emphysema, and asthma mortality is poor. Further, these rates are not age-adjusted, and so the increasing proportion of older age groups in the population leads to a higher incidence of certain diseases of old age (such as heart disease and lung cancer) than would occur if the age distribution were the same as in 1905.

*Bronchitis, emphysema, and asthma includes, for 1955 and 1965, ICD categories 500-502, 527.1, and 241; for 1975, ICD categories 490-493, 466, and 519.3 (chronic obstructive lung disease, not listed in 1965).

Source: US National Center for Health Statistics (202, 250, 251)

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sure, obesity, or diabetes, males who smoke more than 20 cigarettes a day have a mortality rate 2 to 3 times that of nonsmokers (123). There is a definite but much smaller risk of heart disease for pipe and cigar smokers, for women, and for ex-smokers. As in the case of lung cancer, the contrast between British doctors and the male population of England and Wales in general is instructive: in the periods under study, cardiovascular disease death rates for male doctors fell by 6 percent whereas rates for the male population as a whole rose 9 percent (159).

Tobacco use also contributes to cerebrovascular disease and to a wide range of other circulatory system disorders, including arteriosclerosis, the stiffening and hardening of the arteries, and particularly artherosclerosis, the accumulation of fatty materials (lipids) along the walls of medium and large arteries. Both conditions diminish the blood supply available to the heart and other organs (257).

Nonmalignant Respiratory Disease

A third major area of smoking-induced morbidity and mortality is nonmalignant respiratory disease. Smokers are more likely than nonsmokers to suffer and to die from bronchitis, asthma, emphysema, and other disorders of the respiratory system. Moreover, a substantial number of deaths attributed to other causes may be hastened by pulmonary function that is abnormal due to smoking (257). The mortality rate ratios for chronic bronchitis are between 3:1 and 10:1 for smokers compared with nonsmokers, and the rate ratio for deaths from emphysema among heavy smokers is over 20:1 (257). In the study of British physicians, deaths from bronchitis were over 20 times more frequent among those smoking 25 or more cigarettes daily than among nonsmokers. Among the physicians as a group, mortality from bronchitis dropped 22 percent between the 1950s and the 1960s, compared with a reduction of only 4 percent among the total male population (56, 57, 214).

The total impact of tobacco on mortality in a developed country like the United States can only be estimated, but it is clearly large. In an analysis of 1966 data, R.T. Ravenholt calculated that approximately 301,560 deaths in the US from cancer, circulatory system disease, and respiratory ailments were caused by tobacco, compared with 307,310 caused by all infections, accidents, suicides, homicides, and diabetes combined (206). Using the ratio of lung cancer deaths to all excess tobacco-induced deaths of 1:6, he recently estimated that as many as one-quarter of US deaths annually may be attributed to tobacco use (205). From another perspective, E.C. Hammond has calculated that a 25-year-old US male smoking 20 cigarettes a day cuts his life short by over eight years (98), an

> **"Today there can be no doubt that smoking is truly slow-motion suicide. . . . It is nothing short of a national tragedy that so much death and disease are wrought by a powerful habit often taken up by unsuspecting children. . . ."**
>
> **Joseph A. Califano, Jr.**
> **Secretary**
> **US Department of Health,**
> **Education, and Welfare**

estimate since confirmed (210). In England, the Royal College of Physicians figured that the average British male smoker at the age of 35 reduces his life span by 5½ years (214).

The health toll of smoking should be measured not only in mortality but also in morbidity. Smokers have more coughs, colds, minor respiratory infections, shortness of breath, and allergy problems than nonsmokers; they take longer to recover from many respiratory conditions and also, often, from surgery. Moreover, smokers are twice as likely to develop peptic ulcers. In addition to causing personal nuisance and discomfort, tobacco-induced morbidity is estimated to cost as many as 50 million work days every year in Britain (214) and 81 million in the United States (259).

Mortality and Morbidity in Developing Countries

While the epidemiologic information on tobacco-related morbidity and mortality in the developing countries is not nearly as extensive as in the industrialized nations, it is nonetheless clear that tobacco users everywhere suffer from illnesses caused by their habit. The most extensive research on tobacco-related disease in the Third World has taken place in India and began at the turn of the century. Since then a number of studies have described cancers of the oral cavity, which have constituted 15 to 70 percent of all cancers reported in some areas of the country (116). Indian research has associated oral cancers with chewing tobacco, chewing mixtures of tobacco, betel nut, and other ingredients, and smoking homemade cigars in reverse, with the burning end inside the mouth (218). A large survey in the 1960s found oral cancers in almost 52 per 100,000 people (116).

One recent product of Indian research, indicative of its sophistication, is a case-comparison study of 683 male lung cancer cases and 1,279 controls. The study found that cigarette smokers, compared with nonsmokers, faced a relative risk of lung cancer of 2.36. Men who smoked *bidi,* a cigarette of local tobacco rolled in a *temburni* tree leaf, faced a relative risk of 3.38. These relative risks are considerably less than those observed in studies in developed countries. Relative risk differed between Moslems and Hindus, even after stratification for frequency and duration of smoking, which, on the average, did not differ between the two religious groups (190). The researchers ask whether genetic or dietary factors might explain both the low incidence and the difference between religions (190). Inhaling practices, which might help explain both points, were not studied.

Other research on tobacco use and cancer in India has produced these findings:

- For women, the relative risk of developing carcinoma of the hard palate associated with smoking *chuttas,* a type of homemade cigar, with the lighted end inside the mouth was 132 times that for other women (300).
- Cancer of the cheek was eight times more common among those who chewed a mixture of tobacco, lime, and betel nut chips than among those who did not. The effect was related to the amount chewed and the frequency and duration of chewing. Incidence was 30 times higher than for nonusers if the user kept the quid in his mouth all night (304).
- Contradicting the common assumption that traditional forms of tobacco use are less dangerous than smoking manufactured cigarettes, in a series of 25 cases of bronchial cancer in men of the Kashmir Valley, only 2 were cigarette smokers, while 17 smoked only *hookahs,* or water pipes, and 3 smoked both (297).

Reports of cancer associated with tobacco use have recently begun to come from other developing countries as well. A case-comparison study in Rhodesia found 87.5 percent of 32 African lung cancer patients smoked compared with 22 percent of 32 controls. The authors point out that the absence of air pollution in Rhodesia means that cigarette smoking is probably the most important cause of lung cancer there (89). In a South African study of lung cancer, all of the 45 cases but 60 of 90 controls were or had been smokers, and a greater proportion of the cases smoked large amounts of tobacco daily (219). In 500 men with cancer of the larynx in Morocco, only 52 (7 percent) were nonsmokers. Some 80 percent smoked at least 20 cigarettes a day, and 90 percent had smoked for at least 10 years (32).

A large study in Pakistan of 1,192 cases of carcinoma of the oral cavity and oropharynx and 3,562 controls found that chewing betel nut and tobacco increased risk by four times in males and three times in females. Smoking increased risk fivefold in males and 12-fold in females. The highest risks — 10 times higher for

From Raymond Pearl's "Tobacco Smoking and Longevity," 1938

"In the customary way of life man has long been habituated to the routine usage of various substances and materials that are not physiologically necessary to his continued existence. Tea, coffee, alcohol, tobacco, opium and the betel nut are statistically among the more conspicuous examples of such materials. . . . All of them contain substances of considerable pharmacologic potency if exhibited in appropriate dosage. . . . The situation so created is an extremely complex one behavioristically, and not a simple physiological matter, as it is sometimes a little naively thought to be. Purely hedonistic elements in behavior, which are present in lower animals as well as in man, have a real importance. Indeed they frequently override, in their motivational aspects, reason as well as purely reflex physiological inhibiting factors. There are undoubtedly great numbers of beings who would continue the habitual use of a particular material they liked, even though it were absolutely and beyond any question or argument proved to be somewhat deleterious to them. Most of them would rationalize this behavior by the balancing type of argument — that the keen pleasure outweighed the relatively (in their view) smaller harm.

The purpose of this paper is to report a part of the results of an investigation of the influence of tobacco upon human longevity. . . . (T)he net conclusion is clear. In this sizable material the smoking of tobacco was statistically associated with an impairment of life duration, and the amount or degree of this impairment increased as the habitual amount of smoking increased. . . . (T)he differences between the usage groups in specific mortality rates . . . practically disappear from about age 70 on. . . . (T)hose individuals in the damaged groups who survive to 70 or thereabouts are such tough and resistant specimens that thereafter tobacco does them no further measurable harm as a group."

Source: Pearl (196)

men and 13 times higher for women — were associated with chewing tobacco. Smoking a *hookah* carried with it more than three times the risk of smoking cigarettes, and smoking *bidis* was more than seven times as risky as smoking manufactured cigarettes (293).

In 131 Singapore Chinese with esophageal cancer, the relative risk of smoking hand-rolled cigarettes of Chinese tobacco was 2.5 for men and 6.25 for women, both statistically significant ($p < 0.01$). Smoking Western cigarettes was associated with relative risks greater than 1.0 but less than 1.5 — not statistically significant. After several factors were considered jointly, drinking hot beverages proved to be more strongly associated with esophageal cancer than smoking Chinese cigarettes (291). In a Rhodesian study, all 26 male esophageal cancer patients smoked compared with 14 of 26 controls of the same age and sex. Alcohol consumption was also associated with cancer, although not as strongly (306). In a series of 260 consecutive cases of lung cancer seen in Hong Kong, 92 percent of the 180 men and 56 percent of the 80 women smoked. By comparison, a survey of 1,347 men and 1,428 women in the general population found that only 59 percent of the men and 11 percent of the women smoked. Use of a kerosene stove was also associated with lung cancer in women (295).

Chronic obstructive lung disease associated with smoking has been reported from places as diverse as Papua New Guinea, Guyana, and Jamaica. In countries like these, G.J. Miller points out, other factors associated with the disease — atmospheric pollution, a cold damp climate, and industrial hazards — are absent, making the association with smoking clearer. Miller considers smoking to be the major cause of chronic cough and phlegm in the West Indies (170). In Papua New Guinea, in a population where smoking cigars of local tobacco was almost universal, those who inhaled had more chronic lung disease than those who did not (11). In a survey of 2,360 Indian men, chronic bronchitis was diagnosed in 15 percent of smokers and 5 percent of nonsmokers (296). Another Indian survey reported chronic bronchitis in 12.5 percent of 473 men aged 17 to 64. While under 4 percent of the nonsmokers had bronchitis, over 20 percent of the smokers did, even though none of the men smoked more than 20 cigarettes a day (294). Peptic ulcer associated with smoking has been reported from the developing world just as it has from the developed. A household and office survey in Chandigarh, India, detected 22 cases of peptic ulcer in men. Of these, 11 were smokers. Of 2,013 men without ulcers, 28.1 percent smoked. The difference is statistically significant ($p < 0.05$) (303).

Reports from developing nations of vascular diseases linked to smoking are now beginning to appear in medical literature. G.J. Miller, studying 32 survivors of heart attack and 93 controls in Jamaica, found that 15.6 percent of the heart attack cases smoked more than 20 cigarettes a day at the time of the attack compared with 4.3 percent of the controls, for a relative risk of more than four (287). M.A. Dolder and M.F. Oliver, examining risk factors in 240 male survivors of heart attack from seven centers in developed countries and two in developing areas — Bombay and Singapore — found no statistically significant differences in the prevalence of smoking among the groups from various cities, suggesting that smoking plays a role in heart attack etiology everywhere. Smoking, in fact, was the most common of the nine risk factors studied, prevalent in 69 percent (in the US) to 86 percent (in Singapore) of the men (55). Indonesians with peripheral arterial disease had a poorer prognosis if they smoked *kawung*, cigarettes of strong home-grown tobacco rolled in sugar palm leaf, than if they smoked *kretek* cigarettes, a commercial mixture of better grade tobacco with cloves and spices in a paper wrapper, or Western cigarettes, even though they did not smoke more heavily (292).

These studies are examples from the growing body of research on the health effects of tobacco in the developing world. The fact that relationships between tobacco and disease have been less frequently reported than in the industrialized countries seems due to the lack of research, not the absence of disease in tobacco users. The prevalence and incidence of such diseases in developing countries and the degree of risk smoking poses deserve further research.

Harmful Components of Tobacco Smoke

Over four thousand compounds have been identified in the mixture of gases and tarry droplets that make up tobacco smoke (259). Over 30 of these, including the radioactive element polonium 210, are known or suspected contributors to the health hazards of smoking (257), but three in particular have been singled out as the agents most active in causing or promoting disease: carbon monoxide, nicotine, and tar (214, 257, 277). All three are toxic to humans, present in sufficient quantity to be hazardous, and readily absorbed by the exposed tissues, organs, and body fluids.

Carbon monoxide is a colorless, odorless gas produced by incomplete combustion. It makes up about 3 to 5 percent of cigarette smoke (262), depending in part on the porosity of the wrapper paper (277). The smoker who inhales is exposed to a concentration of about 400 parts per million (214). Nonsmokers in a room full of tobacco smoke (sometimes called "passive" or "involuntary" smokers) may inhale concentrations of carbon monoxide as high as 25 to 100 parts per million (143).

The hemoglobin in human blood, which carries oxygen throughout the body, has an attraction to carbon monoxide that is more than 200 times stronger than its attraction to oxygen (142). The strength of this bond, formed with the iron atom of hemoglobin, explains the poisonous nature of carbon monoxide (142). The resultant compound, carboxyhemoglobin, is unable to carry oxygen; as much as 10 percent of the blood's capacity to carry oxygen may thus be lost (91). Carbon monoxide also increases the affinity of hemoglobin for oxygen. This means that release of oxygen to other tissues is impeded (262). Due to these combined effects, blood carboxyhemoglobin concentrations as low as 4 to 5 percent can alter mental ability and performance in normal adults (142). Carbon monoxide may also increase the formation of fatty deposits on arterial walls (214).

Nicotine is a dense, oily alkaloid that has no therapeutic uses (51). The nicotine content of tobacco varies by type of tobacco and the form in which it is used. Pipe tobacco contains between 0.6 and 1.43 percent nicotine by weight; cigars, 0.75 to 3 percent; and cigarettes, 0.9 to 1.96 percent (262). Smokers who inhale absorb as much as 90 percent of the nicotine in their cigarettes (214), an amount ranging from 0.04 to 3.5 mg per cigarette (214, 262). About 60 mg of nicotine is an acutely fatal dosage, but as little as 4 mg can produce symptoms of toxicity in a person whose body is not accustomed to the drug (51). Because the smoke of cigarettes is acidic, nicotine is absorbed mainly after it has entered the lungs; pipe and cigar smoke, on the other hand, is alkaline, which means that more nicotine is absorbed through the lining of the mouth and pharynx (214).

The effects of nicotine on the various tissues of the body are wide-ranging and complex. Nicotine can act on the central nervous system either as a stimulant or a sedative, depending

An estimated 4.9 million metric tons of tobacco were produced worldwide in 1977. (University of Kentucky College of Agriculture)

on the dose and the tobacco user's physiological and psychological constitution (214). Nicotine injections and cigarette smoking both produce the release of adrenaline and noradrenaline and directly influence the nerve centers controlling blood pressure and heart rate. The result in normal individuals is an increase in heart rate, blood pressure, cardiac output, heart stroke volume, velocity of heart contraction, myocardial oxygen consumption, and cardiac arrhythmia (214). Nicotine, both injected and in cigarette smoke, may also raise the content of fatty acids in the blood and stimulate blood platelets to cling to one another and to the walls of blood vessels (214).

Nicotine, the most powerful pharmacological agent in tobacco, is also thought to be responsible for the "smoking habit," that dependence on smoking which makes it difficult for smokers to give it up. As the Royal College of Physicians points out, "the remarkable spread of smoking throughout the world and the difficulty that most smokers find in abstaining suggests that the craving has a pharmacological basis" (214).

Carbon monoxide and nicotine exert a combined action on the heart: carbon monoxide reduces the amount of oxygen available to the heart while nicotine spurs cardiac activity, which increases the heart's need for oxygen. Together with the increased growth of fatty deposits on arterial walls that is attributable to both substances, the increased burden on and stimulus to cardiac function help explain the role of tobacco in coronary heart disease (262), especially acute coronary insufficiency and myocardial infarction.

"Tar" is a dark brown, viscous material composed of condensed particles from cigarette smoke that remain after moisture and nicotine are removed. It is here that known and suspected cancer-initiating and cancer-promoting agents reside. Chief among the known cancer initiators, or carcinogens, in tar are the polycyclic aromatic hydrocarbons (214). More virulent carcinogens such as nitrosamines and beta-naphthylamine are present in smaller amounts (277). The cancer promoters include phenols and fatty acids and their esters (214). They have been known to produce cancers both on the skin of laboratory animals and when inhaled by animals.

Acting separately and in combination, these three ingredients —carbon monoxide, nicotine, and tar—have been repeatedly implicated as responsible for the health hazards of cigarette smoking. While products with lower tar and/or nicotine seem less dangerous, in any amount they have adverse effects on animals and humans.

Research Problems

Although higher death rates from lung cancer have long been statistically associated with cigarette smoking, association per se does not prove a causal link. Proof of a genuine cause-and-effect relationship, as the Surgeon General's Advisory Committee Report emphasized in 1964 (258), depends on the consistency, strength, specificity, temporal relationship, and coherence in the associations noted (258). Another consideration is biological plausibility (110).

With respect to lung cancer, certain respiratory diseases, and a number of cardio- and cerebrovascular conditions, causal relationships with smoking have now been substantially documented. The consistency (or replicability) of findings has been shown, particularly among males, in many different countries, times, and studies. The strength of the relationships is evident not only in high risk ratios in case-comparison studies and high incidence rate ratios in cohort studies, but also in sharply rising national death rates accompanying expanding use of tobacco. The specificity of the association is clear with respect to lung cancer and emphysema, if less so for the broader category of coronary heart disease. The temporal relationship of smoking and various pathologies is documented by correlations between the rate of smoking and the increases in national death rates, and it is reinforced by the falling death rates now beginning to appear for men who have stopped smoking. The coherence of the evidence is apparent not only from the dose-response curves, which show that incidence rates increase linearly with the number of cigarettes smoked per day, but also from the common elements of animal studies, autopsy, and laboratory evidence, which elucidate the biological processes involved in pathogenesis. Altogether the evidence presents a comprehensive scientific indictment of cigarette smoking as a major factor in recent increases in male mortality in many developed countries.

Nevertheless, there remain characteristics of tobacco products, tobacco use, and tobacco users that pose special problems in studying the health consequences of smoking. For example, tobacco has a variety of forms — chewing tobacco, cigars, pipes, and cigarettes — and each form offers innumerable

Tobacco is a filthy weed,
That from the devil does proceed;
It drains your purse, it burns your clothes,
And makes a chimney of your nose.
Oliver Wendell Holmes (1809-1894)

choices of strength, texture, and, in the case of cigarettes, filter, paper, and other ingredients. Each of these variations may affect the risk of tobacco use. Even more important may be individual habits: whether or not the smoker inhales and, if so, how deeply; how many times each cigarette is put into the mouth and how long it is left there; and how far down each cigarette is smoked—an especially important variable since tar and nicotine accumulate near the end of a cigarette as it is smoked and thus are inhaled in greater amounts as the cigarette is smoked to its end. These variables can obscure relationships between the amount smoked and the extent of exposure and make it difficult to categorize smokers by dosage. The effect may be to dilute the apparent strength of dose-response relationships. More attention is needed to developing standard measurements of smoking experience (207).

An even more serious set of research problems resides in the nature of tobacco users themselves. Smoking is statistically associated with certain demographic, psychological, and social characteristics, including age, race, and social class (as indicated by occupation, education level, income, or, in the case of hospital studies, private versus public payment status).

In the US and Britain personality traits seem to be related to smoking, and many studies have been undertaken to try to identify differences between smokers and nonsmokers (106, 117, 118, 138, 153, 221, 234). Commenting on this research, the Royal College of Physicians observed:

> Smokers tend to be impulsive, arousal-seeking, danger-loving risk-takers who are belligerent towards authority. They drink more tea, coffee, and alcohol, and are more prone to car accidents, divorce, and changing of jobs. Some of these characteristics collectively imply a degree of extraversion. Cigarette smokers have been found, on average, to be more extraverted than nonsmokers (70, 71, 72, 227). Although the differences are highly significant statistically, they are small and there is a great overlap between smokers and nonsmokers, so that personality characteristics do not reliably predict which individuals will become cigarette smokers (214).

In other words, to the extent that people who smoke may be less careful about their health in other ways as well, this tendency could contribute to higher death rates quite independently of their smoking habit. Those who question a cause-and-effect relationship between tobacco and various diseases suggest that these personality and behavioral differences contribute substantially to higher mortality (72, 106). None of these studies, however, has quantified the effects of personality on the incidence of specific illnesses such as lung cancer, nor can personality traits be identified that might constitute a "smoker's personality" (153). In fact, the US Surgeon General's report estimates that variations in personality can account for only 3 to 5 percent of the variance in measurement of smoking habit (259). In a carefully designed study, then, these personality variations could only account for a small amount, if any, of the excess mortality that has been observed among smokers. However, studies should control for any variations in behavior that could affect health independent of smoking.

In looking specifically at the impact of tobacco on reproductive health, one major problem is the relatively small amount of research on women smokers. The research gap, now gradually being filled, is due to the fact that women began smoking later than men in most developed countries and that the percentage of women smokers, although increasing, is still well below that of men in almost all countries (see p. L-27). In addition, fertility and the outcome of pregnancy are influenced by many different variables, including not only the fecundity and health of the mother, but also the health of the father, the condition of the fetus, and myriad environmental factors. All those variables need to be taken into account in studies of tobacco and reproductive health.

Finally, much of the early research on outcome of pregnancy and on maternal and child health was not carried out with the same epidemiologic sophistication and attention to multiple variables as more recent studies of steroidal contraception or IUDs, for instance, where research findings can make the difference between introducing and discarding a new product. Nor are the studies on pregnancy as clear cut or as conclusive as the lung cancer and tobacco studies.

There is also little research from the developing countries, where tobacco is rapidly gaining popularity. Although tobacco use seems related to the same diseases seen in developed countries (179), other conditions and predisposing factors may be very different from those in developed countries so the incidence of diseases in smokers may differ. For example, the lower incidence of circulatory system diseases in many developing areas may mean that smoking would produce less increase in cardiovascular and cerebrovascular mortality. On the other hand, conditions that combine with tobacco use to markedly increase the complications of pregnancy may be more common in some developing areas. Also, nutritional deficiencies are more widespread and more severe in many developing countries, and may, in association with smoking, cause or promote adverse conditions. Clearly the proven hazards of tobacco use for males in the developed countries should stimulate more attention to the potential hazards for men, women, and children throughout the world.

PREGNANCY AND CHILDBIRTH

Smoking during pregnancy retards fetal growth and increases the risks of spontaneous abortion, complications of pregnancy, preterm delivery, and late fetal and newborn death. These findings emerge from several decades of research on maternal smoking and the outcome of pregnancy, including a number of studies with populations large enough for researchers to identify those who face especially high risks from smoking (see Table 2).

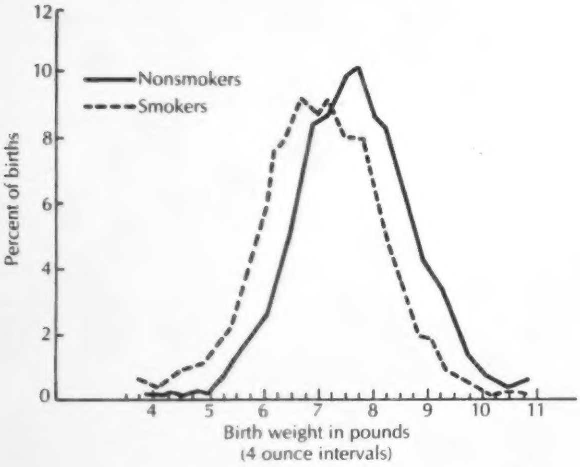
Birth Weight

The clearest finding of research to date is that smoking mothers are more likely than nonsmokers to give birth to underweight babies. According to the 1979 United States Surgeon General's report *Smoking and Health,* more than 45 studies, involving a total of over half a million births, have confirmed that maternal smoking decreases birth weight. The observation is consistent across national, racial, socioeconomic, and geographic lines (259). The fact that the babies of tobacco users have reduced chances for survival is not a result of their low birth weights;

Table 2. Description of Major Studies of Smoking During Pregnancy, 1958-1968

Study Name	Ref. No.	Population	Data Gathering Method	Number Initially Enrolled	Length of Study	Smoking Information Recorded
British Perinatal Mortality Survey	39, 40	Notified/registered births in England, Scotland, and Wales, March 3-9, 1958, and all neonatal deaths in March, April, and May 1958	Questionnaires filled out postpartum by midwives and doctors; follow-up studies of surviving children at 7 and 11 years of age, conducted by the National Child Development Study	17,204 births (approximately 98 percent of all births); 7,851 stillbirths and neonatal deaths	Births: March 3-9, 1958 Neonatal deaths: March, April, May 1958	Number of cigarettes smoked daily in period before pregnancy and at end of fourth month of pregnancy
Cardiff Births Survey	12	All births to women residing in the city of Cardiff, Wales	Interviewed postpartum by Births Survey clerk or midwife	18,631	1965 to 1968	Number of cigarettes smoked daily during pregnancy; "ex-smokers" defined as those who stopped smoking before pregnancy
Child Health and Development Studies	261, 272, 282, 283	Births to women enrolled in pre-paid medical program in the San Francisco-Oakland Bay Area, USA	Interviews early in pregnancy and medical record data beginning before pregnancy; follow-up studies of children at 5 and 10 years of age	Approximately 15,000 pregnancies; nearly 100 percent participation	1959 to 1967	Age at which smoking began; number of cigarettes smoked
Collaborative Perinatal Study of the National Institute of Neurological Disease and Stroke	189	Sampling of approximately 132,000 pregnancies to women at urban university-affiliated US medical centers, including re-registration for later pregnancies	Data collection at prenatal clinic visits and before and after delivery; follow-up studies of surviving children at 8 months, 1, 4, 7, and 8 years of age	53,180; 3.3 percent drop-out rate	1959 to 1965	Number of years of smoking and usual number of cigarettes smoked per day at time of registration
Ontario Perinatal Mortality Study	167, 168, 169	All births at 10 Ontario, Canada, teaching hospitals	Interviews with mothers after delivery; interviews with anesthetists and attending physicians	51,490 (smoking status known for 50,267)	January 1960 to December 1961	Maximum amount smoked at any time during pregnancy, in packs per day
United States Navy Obstetrical Study	37, 242	Deliveries to women at 44 United States naval bases worldwide	Information obtained by attending physicians at admission of women to labor room	48,505	July 1, 1963, to June 30, 1965	Number of cigarettes usually smoked per day and cigarettes smoked during each trimester of pregnancy
(No name) Conducted by the Institut National de la Santé et de la Recherche Medicale	95, 223	Women consulting at 13 Paris hospitals before the third month of pregnancy, with subsequent exclusion of those not born in France, not giving birth at one of the 13 hospitals, and smokers of less than one cigarette per day	Interviews in hospitals	14,548 (reduced to 6,989 by 1969 due to exclusions)	Began 1963	Smoking before pregnancy and during pregnancy to point of consultation; cigarettes per day (heavy smoker = 10 cigarettes per day) and whether or not smoker inhales
(No name)	133	Pregnancies to women in Malmö, Sweden	Self-administered questionnaires provided by gynecologists at time of diagnosis of pregnancy and at subsequent visits, resulting in coverage of the entire pregnancy	6,913; follow-up of 92.2 percent	1963-1964	Number of cigarettes currently smoked per day and in each gestational month, asked on each questionnaire

Figure 2.
Distribution of Birth Weight by Maternal Smoking Status*



*Smokers were those who consumed 20 or more cigarettes per day during pregnancy.

Source: MacMahon et al. (151)

nevertheless, the low birth weights of smokers' infants are an undeniable indication that smoking influences pregnancy, and they raise the possibility that the mechanisms responsible have other effects on the gestation process and the later health of offspring.

The reduction in birth weight from tobacco use may be expressed either as a decrease in the average weight of smokers' babies compared with those of nonsmoking women or as an increase in the percentage of infants who are under a certain weight, usually defined as 2,500 grams. The infants of smoking mothers have an average weight about 200 grams less than that of nonsmokers', and a greater percentage of smokers' babies weigh less than 2,500 grams at birth (12, 38, 43, 46, 73, 133, 146, 167, 172, 176, 189, 200, 208, 216, 217, 223, 242, 283, 285). The effect is dose-related. The more a woman smokes during pregnancy, the greater her chances of having an underweight baby (46, 73, 133, 189, 223, 261). Also, birth weight decreases steadily as the number of cigarettes smoked increases (40, 46, 242).

The effect of smoking is independent of other factors known to influence birth weight, such as the sex of the infant and the age, parity, race, social class, and size of the mother (12, 38, 40, 46, 73, 146, 167, 172, 217, 223, 261). Although infant weight at birth is determined by many genetic, environmental, and pregnancy-related factors, maternal smoking reduces birth weight regardless of the other factors at work: smoking during pregnancy shifts the whole distribution of birth weights, as shown in Figure 2. In fact, smoking is one of the most important factors determining birth weight. M.B. Meyer and colleagues' analysis of over 50,000 births in the Ontario Perinatal Mortality Study found that maternal smoking was associated with a larger difference in birth weight than any of the eight other relevant factors investigated, including history of pregnancy loss, pre-pregnant weight, and socioeconomic status (167).

Data from the developing world now confirm research in the industrialized nations. In order to gather better data from developing countries on key aspects of maternal health care and outcome of pregnancy, the International Fertility Research Program (IFRP) has developed an international Maternity Care Monitoring system. The data bank now includes information on 150,000 deliveries in developing as well as developed countries. The information recorded for each delivery includes birth weight, Apgar score (an index of the newborn's condition based on several factors), maternal education, maternal smoking habits, and some 50 other variables (26). A preliminary analysis by J. Fortney of developing country data from three continents shows, as expected, that birth weights under 2,500 grams occur more often among smokers' than among nonsmokers' babies. Even when the data are controlled for education, which is an important variable, the lowest birth weights are seen in the children of the heaviest smokers (see Table 3). Apgar scores, however, show no apparent link with the amount of maternal smoking. Other variables and possible associations have not yet been analyzed (79).

Smoking habits prior to pregnancy have no appreciable effect on birth weight (40, 207, 285), but there is a difference in findings as to the effect of smoking at various times during pregnancy. A few studies suggest that stopping smoking early in pregnancy eliminates tobacco's effect on birth weight (40, 58), but data from the US Navy Obstetrical Study showed lower birth weights among babies of mothers who smoked during any of the trimesters of pregnancy (242).

The lower average birth weights of smokers' babies cannot be explained as the result of shortened gestational age. First, the reduction in mean length of gestation due to smoking is not great. Expressed as a mean difference, the figures calculated by C.R. Buncher in the US Navy Obstetrical Study are typical; for the woman who smoked 20 cigarettes a day, a female birth would occur 29 hours earlier, a male birth 34 hours earlier than for a nonsmoker (37). It is doubtful that the mean weight differences between smokers' and nonsmokers' infants could be caused by such a short difference in gestational length. Second, among infants of the same gestational age, smokers' children have lower average birth weights than nonsmokers' (12, 38, 40, 167, 216, 223) (see Figure 3).

Causes of Low Birth Weight

Carbon monoxide. Although the causal mechanisms by which tobacco reduces birth weight have not been precisely identified, oxygen deprivation, caused by carbon monoxide, is the most likely explanation. Pregnant women, fetuses, and newborns may be especially vulnerable to oxygen deprivation. The body normally produces a certain amount of carbon monoxide from the breakdown of pigments in hemoglobin, but a pregnant woman's rate of endogenous production may be 50 percent higher than a nonpregnant woman's (140). At the same time, the oxygen-carrying capacity of the pregnant woman's blood is reduced some 20 to 30 percent because of a lower concentration of hemoglobin (142). This lower hemoglobin concentration may account for a rise in carboxyhemoglobin concentration after smoking a single cigarette that is significantly greater for pregnant women than for nonpregnant women (60). Carboxyhemoglobin concentration in the fetus is normally about 10 to 15 percent greater than in the mother, and its elimination by the fetus appears to lag behind maternal elimination (142). P.V. Cole and colleagues measured maternal carboxyhemoglobin levels at delivery in 222 women and found a mean level of 1.2 percent in nonsmokers and 4.1 percent in smokers. Levels in fetuses, they assumed, would be

Table 3. Percentages of Women in Developing Areas Delivering Infants with Birth Weights above and below 2,500 Grams, by Smoking Habit and Education, 1975-1978

Birth Weight (in grams)	Education (Years Completed)											
	None			1-6			7+			Total		
	Smoking			Smoking			Smoking			Smoking		
	None	Light	Heavy	None	Light	Heavy	None	Light	Heavy	None	Light	Heavy
Asia, developing[1]												
<2500	35.9	49.0	71.4	25.9	30.2	66.7	17.8	30.6	25.0	23.3	42.3	57.1
≥2500	64.1	51.0	28.6	74.1	69.8	33.3	82.2	69.4	75.0	76.7	57.1	42.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	(2,445)	(143)	(7)	(4,476)	(43)	(3)	(7,768)	(36)	(4)	(14,689)	(222)	(14)
Latin America[2]												
<2500	9.6	8.7	11.9	7.9	9.3	9.8	7.7	9.7	8.8	8.0	9.4	9.8
≥2500	90.4	91.3	88.1	92.1	90.7	90.2	92.3	90.3	91.2	92.0	90.6	90.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	(4,522)	(633)	(446)	(30,512)	(4,344)	(3,706)	(19,304)	(3,568)	(1,000)	(54,338)	(8,545)	(5,152)
Mid East & Africa[3]												
<2500	5.5	6.3	6.7	6.0	10.7	25.0	6.4	10.7	25.0	5.8	7.9	13.0
≥2500	94.5	93.7	93.3	94.0	89.3	75.0	93.6	89.3	75.0	94.2	92.1	87.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	(11,292)	(95)	(15)	(4,655)	(28)	(4)	(2,682)	(28)	(4)	(78,629)	(151)	(23)

[1] Asia, developing, includes Bangladesh, India, Pakistan, the Philippines, and Sri Lanka.
[2] Latin America includes Brazil, Chile, Colombia, El Salvador, Honduras, Mexico, Panama, Uruguay, and Venezuela.
[3] Mid East & Africa includes Egypt, Iran, Nigeria, Sudan, and United Arab Emirates.

Source: Fortney (International Fertility Research Program) (79)

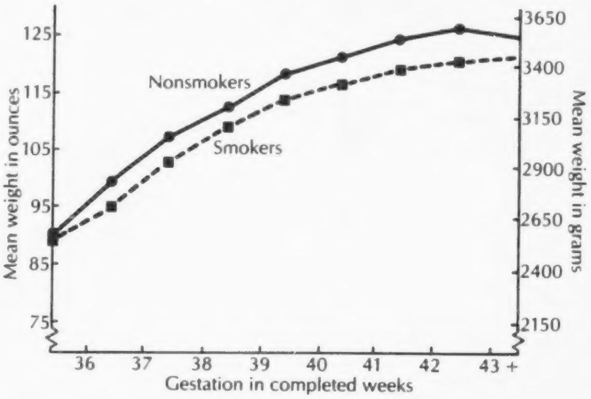
correspondingly higher than those in the two groups of women (41).

Elevated hemoglobin and red blood cell levels, signs of fetal adaptation to lack of oxygen, further implicate oxygen deficiency as the cause of low birth weight in smokers' infants. Higher levels in smokers' offspring have been found both in umbilical cord blood (61) and in the blood of 48-hour newborns (87). In the latter study the effect was dose-related. Levels in mothers were not affected by smoking (87).

The possibility that reduced oxygen supply during gestation leads to low birth weight is supported by similarities between the birth weights of smokers' infants and the birth weights of infants born to women living at high altitudes. Meyer notes that studies of births at high altitudes report a downward shift in the whole distribution of birth weights — a shift independent of gestational age. She also notes that weight decreases progressively as altitude increases, just as weight decreases progressively as tobacco use increases (168). In both cases, the small size of infants may be an adaptation that reduces the risk of death when oxygen is in short supply.

Examination of placentas provides more clues to understanding tobacco's effects on pregnancy. Although the babies of smokers are smaller than nonsmokers', their placentas are not; thus, the placental ratio (the ratio between placental weight and birth weight, also known as the placental coefficient) is higher for smokers (176, 271, 272). Meyer notes that studies find the same in births at high altitude (168). The higher placental ratio may indicate an adaptation to allow better oxygen transport to the fetus. R.L. Naeye, in a study of the placentas of 46,754 infants whose mothers reported their smoking habits in the Collaborative Perinatal Project of the US National Institute of Neurological and Communicative Disorders and Stroke, found that in births at 33 or more weeks gestation the placentas of heavy smokers actually weighed more than those of light smokers and nonsmokers (183). Further, studies of high altitude births and of smokers' births both report structural changes in placentas that would increase their oxygen-diffusing capacity (168). A French study comparing the placentas of 248 women who smoked at least five cigarettes a day during pregnancy and

Figure 3.
Mean Birth Weight by Length of Gestation and Maternal Smoking Status, British Perinatal Mortality Survey



Source: Butler & Alberman (38)

those of 196 nonsmokers found a significantly higher number of abnormalities attributable to inadequate oxygen among the smokers' pregnancies. However, the researchers found no relationship between these abnormalities and birth weight (229).

Nicotine. In addition to carbon monoxide, nicotine may contribute to the smaller size of smokers' babies. A comparison of 209 infants born to mothers who chewed tobacco but did not smoke (and thus were not exposed to carbon monoxide from the combustion process) and 1,148 infants born to women who did not use tobacco in any form showed a clear deficit in birth weight of from 100 to 200 grams among the babies of tobacco chewers (131).

Although nicotine's effects on circulation are complex, the agent's powerful vaso-constricting action is likely to reduce placental blood flow, which may help account for the lower birth weights of smokers' infants. L.M. Hellman and colleagues found that cigarette smoking stimulated fetal tachycardia (unusually rapid heartbeat rate) as quickly as did an experience that frightened the mother. The speed of this reaction prompted them to suggest that a change in uterine circulation was responsible (107). A recent study in Finland helps substantiate their hypothesis: 12 subjects in good health who had completed at least 35 weeks of pregnancy experienced a decrease in placental intervillous blood flow immediately after smoking a cigarette. Within 15 minutes the flow had returned to normal (136).

The possible effects of carbon monoxide and nicotine upon birth weight might also be involved in the as-yet-unidentified mechanisms causing higher rates of pregnancy complications, preterm delivery, and perinatal loss among smokers. One hypothesis suggests that attempts to compensate for lack of oxygen either fail or lead to placental pathology, in turn producing complications and perinatal loss (162, 168). More research is needed on the relationship between undesirable outcomes of pregnancy linked to smoking and the effect of various tobacco components on placental and fetal development.

Cyanide. Vitamin depletion due to cyanide may also contribute to the lower weights of smokers' babies. Elevated levels of cyanide and thiocyanate (formed in the detoxification of cyanide) have been found in the blood and urine of pregnant smokers (200). Detoxifying cyanide requires increased vitamin B_{12} and essential sulfur amino acids. Thus the detoxification process may deprive the fetus of these nutrients (149, 200). Lower serum vitamin B_{12} levels have been found among pregnant smokers than among pregnant nonsmokers, and measurements of B_{12} levels made before the 20th week of pregnancy showed a consistent, although not statistically significant, positive relationship to birth weight (149).

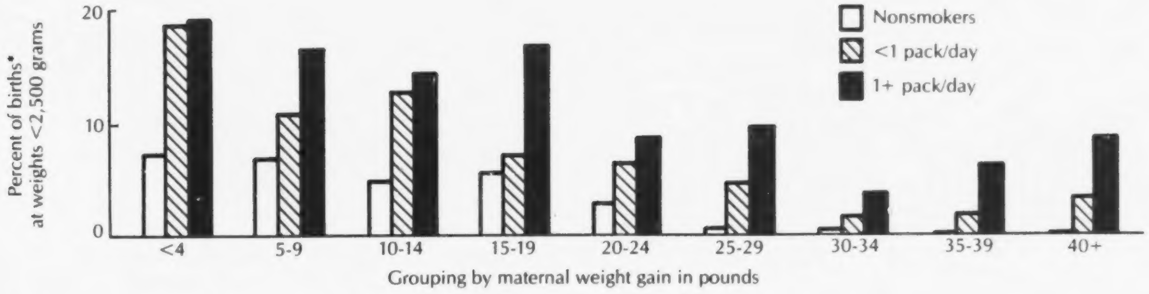
Other hypotheses. The bulk of the evidence suggests that carbon monoxide and nicotine are primarily responsible for lower birth weights. Other factors, such as maternal weight gain and constitutional (or self-selection) factors, are far less satisfactory explanations.

A few researchers have suggested that cigarette smoking depresses a woman's appetite during pregnancy and the decreased caloric intake accounts for lesser fetal growth — an opinion mirrored in the popular opinion that a pregnant woman can compensate for the effect of smoking by eating more. Researchers support this contention with evidence that the smoking mothers who had low birth weight infants had themselves gained less weight during pregnancy than had nonsmokers (53, 215). In addition, in the Collaborative Perinatal Project study of over 50,000 births, S. Garn and colleagues found that the infants of obese smokers were in fact heavier on the average than those of all nonsmokers. They did not, however, compare the obese smokers' infants with the infants of obese nonsmokers (83, 84).

Other research contradicts the nutrition hypothesis. In some studies, no appreciable differences in maternal weight gain between smokers and nonsmokers were found (62, 156, 164, 241). In the Ontario Perinatal Mortality Study, Meyer divided all smokers into maternal weight gain groups by five-pound intervals; within each group smokers delivered a higher percentage of infants weighing under 2,500 grams than did nonsmokers (see Figure 4) (164). She points out that at later stages of pregnancy an increasingly large proportion of weight gain is fetal growth as opposed to weight gain from added maternal tissue. Thus, smoking slows fetal weight gain, which in turn is reflected in less maternal weight gain. "The mother gains less weight in late pregnancy because the fetus gains less weight, and not vice versa" (164).

Data from the Collaborative Perinatal Project substantiate this observation, especially for women who smoked 20 or fewer cigarettes a day. Their lesser weight gain — averaging 90 grams less than for nonsmokers — was due entirely to the lighter weight of their infants. In the case of those smoking more, who

Figure 4.
Percentage of Underweight (<2,500 Gram) Births by Level of Maternal Smoking, Grouped by Maternal Weight Gain, Ontario Perinatal Mortality Study



*Live births at 36 or more weeks of gestation to patients of public hospital status

Source: Meyer (164)

gained an average of 533 grams less than nonsmokers, about one-third of the deficit, or 150 to 200 grams, was due to the smaller size of the newborn (183).

The body proportions of underweight babies born to smokers do not resemble those of infants born to mothers with nutritional deficiencies. Infants of smoking mothers are more likely than nonsmokers' to have an abnormally short crown-heel length, in contrast to the "long, thin baby" of the woman who is undernourished (172). Thus the preponderance of evidence belies the widespread belief that eating more will compensate for the effects of smoking.

The self-selection argument also has been raised in the study of tobacco and birth weight, its proponents contending that low birth weight is due to the constitution of the *smoker* rather than to *smoking* per se (109, 282). Research findings on birth weight and tobacco militate against explanations involving inherent features of the smoker, however. Large-scale studies have consistently found a tobacco-related effect in subgroups known to have low weight infants and in a number of different cultures and countries. Consistent reports of a dose-response relationship also cast doubt on the self-selection argument, since a constitutional predisposition could explain such a phenomenon only if the degree of inherent tobacco craving and the degree of fetal growth retardation were related in a linear manner (86).

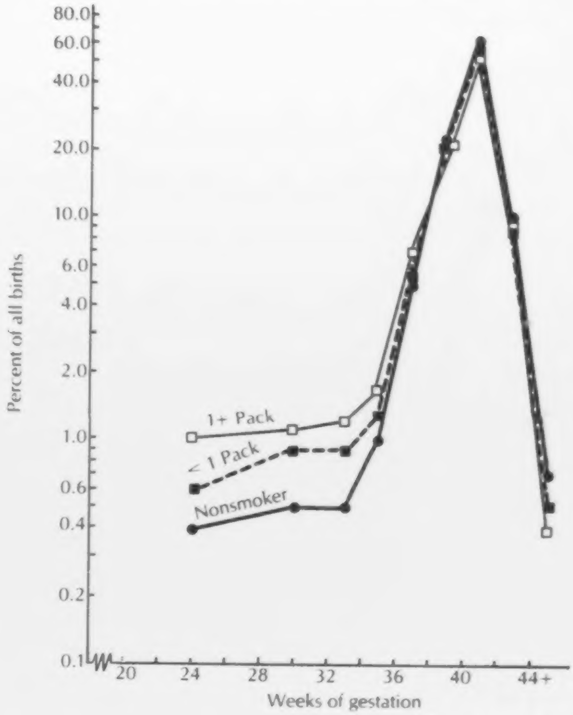
Another problem with the self-selection argument is that it does not propose a causal mechanism that can be tested: the postulated characteristics of smokers that differentiate them from nonsmokers are such all-embracing behavioral and personality variables that they cannot be specified or, consequently, tested (93). In contrast, researchers who cite specific causal agents in tobacco are able to link their research to a growing body of clinical and laboratory studies.

The best test of any self-selection hypothesis is to have cases serve as their own controls. Naeye's recent study of 2,100 repeat pregnancies in the same women revealed that those who smoked during one pregnancy but not another gave birth to smaller infants in the pregnancy during which they smoked. This difference occurred irrespective of eight other factors known to be associated with differences in fetal weight, among them birth order, sex of offspring, pre-pregnancy body weight, and socioeconomic status in the interval between pregnancies (183).

Length of Gestation

The developmental maturity of the fetus is a critical factor in its ability to survive, hence the importance of an optimal length of gestation. Smoking during pregnancy shortens the gestational period, but not uniformly for all pregnancies. Although this reduction in length of gestation has only a slight effect on overall averages, there is an observable increase, due to tobacco use, in the percentage of infants who are gestationally premature (12, 38, 73, 167, 283) (see Figure 5). For instance, data from a 1970-1971 Quebec study, in which the lengths of pregnancies and the smoking habits of more than 6,000 women were recorded, show that birth occurred before 38 weeks of pregnancy in 16.5 percent of the smokers compared with 12.2 percent of the nonsmokers (73). J. Andrews and J.M. McGarry reported that, of pregnancies resulting in live births, 9.2 percent of smokers had spontaneous deliveries before 37 full weeks of pregnancy as opposed to 6.7 percent of nonsmokers, with ex-smokers ranking between them, at 7.5 percent, in a statistically significant distribution (12).

Figure 5.
Distribution of Gestation Lengths by Maternal Smoking Level, Ontario Perinatal Mortality Study



Source: Meyer (162)

Meyer and colleagues found a dose-response relationship between the amount smoked and the number of gestations of less than 38 weeks. They ranked smoking third in strength among nine factors associated with shortened gestation length, exceeded only by history of pregnancy loss and by socioeconomic status as indicated by private versus public patient hospital status (167). No consistent dose-response relationship emerged in a US study of 4,183 births, but the effects of smoking on gestation length appeared to be more pronounced among blacks. Some 13.3 percent of babies born to nonsmoking black women were of less than 37 weeks gestation compared with 24.5 percent of babies born to black women who smoked 20 or more cigarettes daily. Among whites 4.4 percent of nonsmoking women had infants of less than 37 weeks gestation, while for women smoking 30 or more cigarettes daily the figure was 6.6 percent (146).

Maternal weight does not appear to alter the effects of smoking on gestation length. Examination of 271 spontaneous births before 37 weeks of pregnancy, reported in the British Perinatal Mortality Survey, revealed that smokers in all maternal weight groups had higher rates of spontaneous preterm births than nonsmokers. For example, among women weighing less than 50.8 kilograms at the start of their pregnancies, smokers had a prematurity rate of 33.7 per thousand in contrast with 25.0 among nonsmokers (75).

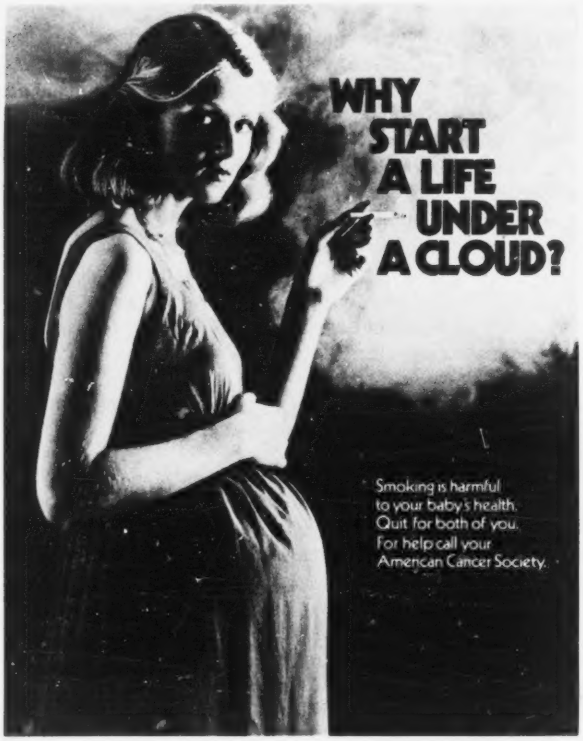
Complications of Pregnancy

Smoking is associated with complications of pregnancy and labor. The complications include premature rupture of membranes, bleeding during pregnancy, placenta previa (a placenta that has developed so low in the uterus that it is in contact with or covers a part of the internal os of the cervix), and abruptio placentae (the premature detachment of the placenta).

Early rupture of membranes can bring on serious complications in the form of premature labor and intrauterine infection. The latter problem can result in fatal septic shock for the mother as well as illnesses in the fetus such as congenital pneumonia (24).

Bleeding in large amounts is an obvious risk to the pregnant woman. It is also associated with higher perinatal mortality: hemorrhage in the latter half of pregnancy, which takes place in about 3 percent of all births in the United States, accounts for one-fourth to one-third or more of perinatal loss (108). Smokers experience a 25 to 50 percent higher incidence of bleeding during pregnancy than nonsmokers (12, 146, 261). In the Cardiff study, this effect was independent of parity (12). The most common source of bleeding in the latter part of pregnancy is the placental area, and placenta previa or placental abruption is often the cause (94, 108).

These placental complications pose a serious threat to both perinatal survival and maternal health. Perinatal mortality rates in the Ontario Perinatal Mortality Survey stood at 26 per thousand for all births, but jumped to 109 per thousand in cases of placenta previa and 266 per thousand for abruptio placentae (167). Treatment of placenta previa may require cesarian section and transfusions for the pregnant woman. In the United States, use of these techniques since the late 1920s has markedly reduced maternal mortality from placenta previa (203). Placental abruptions typically result in maternal shock. In severe cases whole blood is needed immediately in large quantities in order to save the woman's life (108, 203). Both placenta previa and abruptio placentae are more likely among women of high parity (108). In many developing areas where a large proportion of women giving birth are of high parity and optimal facilities for emergency obstetrical care are not readily available, these complications may be more frequent and pose a greater threat to maternal health and infant survival than in the industrialized countries.



In 1975 only 60 percent of US women knew that smoking was harmful to the fetus. This poster from the American Cancer Society aims to broaden awareness of the risks of smoking during pregnancy. (American Cancer Society)

The most detailed analysis of associations between smoking and complications of pregnancy comes from the Ontario Perinatal Mortality Study. Researchers found that smokers experienced an increased risk of placental complications that rose with the amount smoked. Expressed as a median increase, the risk to those who smoked fewer than 20 cigarettes daily amounted to 28 percent more than the risk to nonsmokers, and the risk to heavier smokers was 85 percent more than the risk to nonsmokers (167). The risk of placental complications for smokers became even more marked when deliveries took place early in gestation, as they are more likely to do in smokers. The same tendency was observed for premature rupture of membranes. Among deliveries before 34 weeks of gestation, the smokers' risk of premature rupture was three times greater than the nonsmokers' (168).

One fairly consistent finding in research on tobacco and complications of pregnancy is that the incidence of toxemia is lower among smokers than nonsmokers (12, 38, 133, 217). In the Cardiff Survey, 4.1 percent of smokers showed signs of mild to moderate pre-eclamptic toxemia (a toxemia of late pregnancy characterized by hypertension, albuminuria, and edema) as opposed to 5.8 percent of the nonsmokers (12). The agent in tobacco smoke that brings this about may be cyanide, by its metabolism to thiocyanate, which lowers blood pressure (12, 62). Despite this seemingly beneficial effect, if pre-eclampsia or hypertension does develop in the smoking woman, her infant runs a decidedly greater risk of perinatal death (12, 62, 217). Data from Scotland on cases of pre-eclampsia among 2,500 women having their first child revealed a perinatal mortality rate of 21.7 percent for smoking mothers, a striking contrast to the 8.5 percent mortality for births to nonsmoking pre-eclamptic women. Some 2.4 percent of the 939 smokers and 5.2 percent of the 1,604 nonsmokers were diagnosed as pre-eclamptic (62).

Spontaneous Abortion

Tobacco use during pregnancy may increase the incidence of spontaneous abortion (111, 114, 129, 133, 211, 223, 241). A recent case-comparison study of smoking and spontaneous abortion, conducted in New York and comprised of 574 women who experienced spontaneous abortions and 320 controls, estimated the risk of spontaneous abortion among women who smoked during pregnancy to be 80 percent higher than that among nonsmokers — a significant difference (129). Reanalysis of the data suggests that the risk is dose-related and is lower among women between 27 and 31 years of age than among those 18 to 26 and 32 to 40, although the difference was statistically significant only in the group under age 27 (150).

The New York research is especially noteworthy because it was conducted after abortion became legal in that state. Thus there was little danger that induced abortions would be reported as spontaneous, a problem that could not be excluded from other studies (133, 223). In a Swedish study Kullander and Källén found that, from the fourth through the seventh months of pregnancy, the proportion of miscarriages involving smokers

"Since it is so hurtful and dangerous to youth I wish that it might have the pernicious nature expressed in the name and that it were as well known by the name of youth's bane as by the name of tobacco."

"The copy of a letter written by E.D., Doctor of Physic, to a gentleman by whom it was published," London, 1606

increased (133). It has been suggested that the underlying causes of these late miscarriages could be the same as those that bring about perinatal mortality from placental complications. This is in contrast to fetal abnormalities, which typically account for a large percentage of earlier spontaneous abortions (1).

PERINATAL MORTALITY

The term perinatal mortality refers to both stillbirths and newborn deaths. It is usually defined as fetal deaths at 20 weeks or more of gestation plus neonatal deaths within the first week after delivery. Studies in both developed and developing countries show a higher risk of perinatal mortality to the offspring of women who use tobacco than to the offspring of nonusers. This mortality would include not only spontaneous abortions after the fifth month of pregnancy, noted above, and deaths resulting from specific complications of pregnancy and delivery, but also the many perinatal deaths for which precise causes of death are not known. Importantly, according to research findings from the developed countries, such factors as anemia, high parity, and low socioeconomic status, in themselves associated with high risk of perinatal death, yield even greater risks when combined with tobacco use.

Developed Countries

Unlike its effect on birth weight, the effect of maternal smoking on perinatal mortality is not felt equally in all childbearing populations; rather, it adds to the risk of those already more vulnerable for other reasons. The differences in the effect of smoking on different groups of women are probably the main reason that researchers have not obtained more similar results in their studies of smoking during pregnancy and its effects on perinatal mortality. As reviews of the literature on smoking and perinatal mortality point out (169, 201, 259), some studies do not standardize their data for other important factors and so may differ in their conclusions regarding the effect of smoking. Table 4 summarizes the results of selected major studies in developed countries on smoking during pregnancy and perinatal death without regard to other risk factors. Table 5, by contrast, reports a breakdown of risks associated with important subgroup characteristics and reveals the impact of smoking on specific subgroups.

Where researchers, setting aside the differences among subgroups, have estimated an average increased risk to smokers, their figures range from 24 to 43 percent (40, 43, 73, 216). Comparing smoking's impact with that of seven other factors linked to perinatal mortality, Meyer and colleagues ranked tobacco use fourth, after (1) history of pregnancy loss, (2) private versus public (government-supported) hospital patient status, an indicator of social class, and (3) the combined factors of age and parity (167).

A clear dose-response relationship can be seen in the data on smoking and perinatal mortality (12, 46, 101, 169, 189, 223). When Meyer and colleagues investigated the effect of different amounts of smoking while controlling for seven other factors affecting perinatal mortality, the risk of perinatal death, compared with nonsmokers', was 20 percent higher for those smoking less than one pack (20 cigarettes) a day, but rose to 35 percent higher for those who smoked more (167).

Major factors that affect perinatal mortality include: prior pregnancy outcome, with a history of fetal death associated with increased risk (249); maternal age, with increased losses among women younger than 25 and older than 29 (249); parity, with first births and high parity births in more danger than second births (166, 249); social class, with increased mortality as socioeconomic status falls (38); and low maternal hemoglobin, which is found more often in higher age and parity groups and in lower social classes (38).

When these and other factors affecting risk of perinatal mortality are taken into account, the women who are in the greatest danger of losing their infants because of tobacco use can be identified. For example, among US white women in the upper socioeconomic strata who smoke lightly and are at optimal childbearing age and parity, the effects of tobacco are almost impossible to demonstrate (169); however, among US blacks, who have a lower standard of living, the rate of perinatal death for smokers' offspring may be as much as 86 percent higher than that for nonsmokers' offspring (216). Maternal smoking increases perinatal mortality risk 70 to 100 percent among infants of mothers in lower socioeconomic strata who are of high parity or have a history of delivering low birth weight infants (169).

The lesser probability of survival for smokers' babies is especially marked among women with anemia: the risk of perinatal death nearly doubles for offspring of anemic women who smoke 20 cigarettes or more daily (169). Severe anemia (defined as eight grams of hemoglobin or less per 100 ml of venous blood) may as much as triple the risk of perinatal mortality due to smoking (169).

The pregnant woman who smokes may be aggravating anemia's effects on pregnancy in a number of ways. In T.F.B. Dow and colleagues' study of carboxyhemoglobin increase in response to cigarette smoking among pregnant and nonpregnant women, the greater rise in pregnant women was even more pronounced in cases of anemia (60). The depletion of vitamin B_{12} stores due to smoking during pregnancy (150) might also aggravate an anemic condition and so its effect on fetal well-being. A US study of urban pregnant women discovered noticeably higher lead accumulation in smoking mothers and their fetuses. This higher lead level reduced the activity of an enzyme that assists red blood cells in making hemoglobin. However, the researchers did not find a correlation between lead levels and anemia (132).

The Search for Causes

The mechanisms or biological processes that bring about excess deaths among smokers' infants are not fully understood. Assigned causes of fetal and neonatal death suggest that perinatal loss associated with tobacco use is not a product of abnormalities of the fetus itself so much as a result of problems in the course of the pregnancy. The Cardiff community study

Table 4. Perinatal Mortality and Smoking during Pregnancy, Selected Studies of Single Births, 1967-1975

Author & Date	Ref. No.	Population	No. of Smokers	No. of Nonsmokers	Perinatal Mortality (per 1,000)		Rate Ratio[a] (Smokers/ Nonsmokers)
					Smokers	Nonsmokers	
Andrews & McGarry 1972	12	Cardiff Births Survey: births to women residing in Cardiff, Wales, 1965-1968	7,570	10,176	29.1	24.4	1.19
Butler et al. 1972	40	Births in England, Scotland, and Wales, March 3-9, and all neonatal deaths in March, April, and May 1958	6,890	14,898	41.1	32.0	1.28[b]
Comstock et al. 1971	43	Washington County, Maryland, USA, county records of live births and death certificates, 1953-1963	4,641	7,646	21.5[c]	15.4[c]	1.40
Cope et al. 1973	46	Government-supported and private status births, Sydney, Australia, hospital, September 1969 to December 1970	1,223	2,844	27.8	21.1	1.32
Fabia 1973	73	10% sample of birth certificates in Quebec, Canada, 1970-1971	3,004	3,954	16.9	13.6	1.24[d]
Goujard et al. 1975	95	Deliveries in 13 Paris maternity hospitals, 1963-19?	———9,169———		23.3[e]	9.2[e]	2.53[f]
Kullander & Källén 1971	133	Prospective study of pregnancies in Malmö, Sweden, 1963-1964	2,458	3,282	25.2	17.7	1.42[g]
Meyer et al. 1974	169	Ontario Perinatal Mortality Study, government-supported and private births, 10 Ontario, Canada, teaching hospitals, 1960-1961	21,909	28,358	29.5	23	1.28
Niswander & Gordon 1972	189	Prospective study of pregnant women admitted to clinics of 14 US hospitals, January 1959-December 1965	18,425	20,311	39.8	35.5	1.12
Rantakallio 1969	299	All liveborn and stillborn infants in Oulu and Lapland, Finland, weighing ≥ 600 gms	3,468	8,898	23.4	23.2	1.01
Rush & Kass 1972	216	Registrants at the Prenatal Clinic, Boston City Hospital, USA, 1961-1962	1,538	1,738	41.0	28.8	1.42
Underwood et al. 1967	242	Women giving birth at 44 US naval bases worldwide	24,865	23,629	20.8	19.7	1.06
Yerushalmy 1972	282	Child Health and Development Studies: prospective study of pregnancies to women in prepaid medical program in the San Francisco-Oakland Bay Area, 1960-1962	———13,083———		13.8	12.5	1.10

[a] Authors make no statements regarding statistical significance except where noted.
[b] Statistically significant ($p < 0.001$)
[c] Neonatal deaths only
[d] Found not statistically significant
[e] Rates are for stillborns only
[f] Statistically significant ($p = 0.0001$)
[g] Separate risks before birth, during birth, and during the first postnatal week were not statistically significant.

found more pneumonia, respiratory distress syndrome, and immaturity, and fewer congenital malformations associated with neonatal deaths of smokers' infants than of nonsmokers' (12). In the Ontario Perinatal Mortality Study, the largest categories of causes of fetal death in smokers' pregnancies were "unknown" and "anoxia" (lack of oxygen); the fetuses were normal but had died nonetheless. Among causes of neonatal death, "prematurity alone" and "respiratory difficulty" — signs that a normal baby was born too soon — were foremost (168).

Too short a pregnancy may be a key cause of perinatal death. Since gestational maturity is a critical determinant of perinatal viability, any factor that brings about an earlier delivery — as smoking does — will also increase risk of death. Looking at risk of perinatal death by length of gestation, Meyer and J.A. To-

Table 5. Perinatal Mortality and Smoking during Pregnancy, by Subgroup Characteristics, Selected Studies, 1969-1975

Author & Date	Ref. No.	Subgroup[1]	Perinatal Mortality (per 1,000) Smokers	Nonsmokers	Rate Ratio (Smokers/Nonsmokers)
Butler & Alberman 1969	38	**Class[2]**			
		social classes I & II	26.3	25.8	1.02
		social classes III	49.0	34.1	1.44
		social classes IV & V	41.1	31.7	1.30
Cope et al. 1973	46	**Dosage[3]**			
		light smokers	25.4	21.1	1.20
		heavy smokers	29.9	21.1	1.42
Fabia 1973	73	**Parity**			
		0	18.7	14.2	1.32
		1-3	11.2	11.2	1.00
		4+	36.1	21.8	1.66
Meyer et al. 1974; Meyer 1979	165, 169	**Age and Dosage[4]**			
		Under 20, light smoker	23	26	0.88
		Under 20, heavy smoker	37	26	1.42
		20-24, light smokers	25	20	1.25
		heavy smokers	30	20	1.50
		25-34, light smokers	27	23	1.17
		heavy smokers	31	23	1.35
		Over 35, light smokers	44	30	1.47
		heavy smokers	47	30	1.57
		Parity and Dosage[4]			
		0, light smoker	22	21	1.05
		heavy smoker	26	21	1.24
		1, light smoker	23	22	1.04
		heavy smoker	29	22	1.32
		2-3, light smoker	30	24	1.25
		heavy smoker	30	24	1.25
		4+, light smoker	44	30	1.47
		heavy smoker	52	30	1.73
		Class Indicator and Dosage[4]			
		Private Patient			
		light smoker	26	21	1.24
		heavy smoker	27	21	1.29
		Public Hospital Patient			
		light smoker	36	30	1.20
		heavy smoker	52	30	1.73
		Hemoglobin and Dosage[4]			
		± 11 gm/dl			
		light smoker	25	23	1.09
		heavy smoker	28	23	1.22
Niswander & Gordon 1972	189	**Race and Dosage[5]**			
		white, light smoker	35.0	31.4	1.11
		heavy smoker	37.2	31.4	1.18
		black, light smoker	43.5	38.5	1.13
		heavy smoker	95.2	38.5	2.47
Rush & Kass 1972	216	**Race**			
		white	31	29	1.07
		black	54	29	1.86
Yerushalmy 1972	282	**Race**			
		white	11.3	11.0	1.03[6]
		black	21.5	17.1	1.26

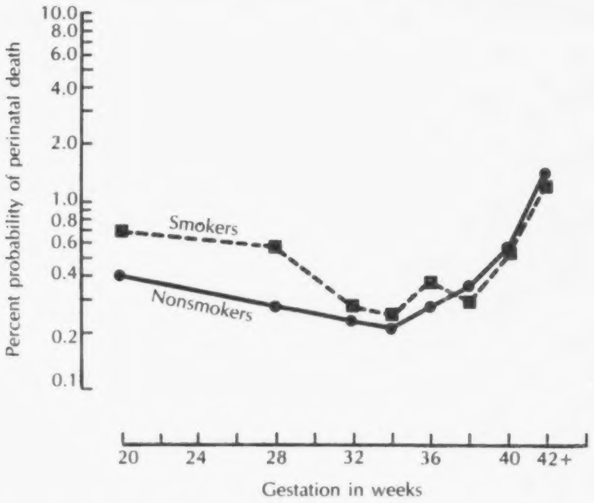
[1] See Table 3 for more information on each study.
[2] Social class I is highest.
[3] 10 cigarettes or fewer per day or more than 10 cigarettes per day
[4] Fewer than 20 cigarettes per day or 20 or more cigarettes per day
[5] Fewer than 20 cigarettes per day and occasional smokers or 20 or more cigarettes per day
[6] Neonatal deaths only

nascia found that smokers' pregnancies showed high vulnerability to loss in the earliest weeks; the relative difference tapered off from a doubling of death risk at 20 weeks of gestation to no appreciable difference from 38 weeks on (168). Figure 6 illustrates the probability of perinatal loss for smokers' and nonsmokers' pregnancies, using an initial population of all pregnancies *in utero* at 20 weeks of gestation.

Although birth weight has often been used as a convenient measure of maturity (224), the lower birth weight of smokers' babies is a sign of trouble rather than a cause of it. Low birth weight itself does not explain the higher rates of perinatal mortality among smokers' infants. In fact, in comparisons of mortality rates limited to infants weighing less than 2,500 grams, the smokers' infants survive better (12, 242, 283). Part of the reason for this paradox lies in the fact that the comparison is confined to underweight babies. The nonsmoker's underweight baby is more likely to be small due to shortened gestation period, which can make survival extremely difficult, whereas the smoker's underweight baby is more likely to be gestationally mature (166, 269). This is so even though, looking at all births, a higher percentage of smokers' babies than of nonsmokers' are immature. Thus the rule of thumb that the less an infant weighs, the greater its mortality risk cannot be applied in comparisons like those of smokers' and nonsmokers' offspring, which involve groups that differ in their risks of perinatal mortality (166). A likely explanation of the relationship between birth weight and perinatal mortality is that some of their causes — perhaps shortage of oxygen in particular — may be the same. The oxygen shortage hypothesis is supported by observations of higher perinatal mortality rates at high altitudes, where oxygen is scarce (96, 158).

Pregnancy complications also appear to play a role in tobacco-related perinatal mortality. Each of the complications of pregnancy associated with smoking has been found to be involved in a significantly larger proportion of perinatal deaths for smoking mothers than for nonsmokers. In the Cardiff survey, antepartum hemorrhage leading to stillbirth occurred in 0.11 percent of all births to nonsmokers but in 0.39 percent of births to smokers (12). Kullander and Källén found abruptio placentae in 12 of 62 neonatal deaths (19 percent) for smokers but in only 2 of the 58 deaths (3 percent) for nonsmoking mothers, a statistically significant difference (133). French researchers also looked at abruptio placentae cases leading to 13 stillbirths and found that 46 percent of the mothers were smokers as opposed to only 12 percent of the 9,069 women giving birth to live infants (95). Ontario Perinatal Mortality Study data show an unexpectedly high representation of premature membrane rupture, antepartum bleeding, placenta previa, and abruptio placentae among fetal and neonatal deaths of smokers' offspring (168). An estimated 10 percent of all perinatal deaths were attributed to maternal smoking, and placental complications and antepartum bleeding accounted for one-third to one-half of those deaths (167).

Figure 6. Probability of Perinatal Death in Pregnancies of Smokers and Nonsmokers, by Length of Gestation, Ontario Perinatal Mortality Study



Note: Overall probabilities of perinatal death were, for smokers, 2.9 percent (624 deaths in 21,465 births) and, for nonsmokers, 2.3 percent (634 deaths in 27,420 births).

Source: Meyer & Tonascia (168)

Table 6. Perinatal Mortality Rates in Offspring of Smoking and Nonsmoking Mothers, by Education and Antenatal Care, Dacca, Bangladesh, 1977-1978

	Deaths per 1,000 births (numbers in parentheses)		
	Nonsmokers	**Smokers**	**Total**
Some education	78.9 (507)	285.7 (7)	81.7 (514)
No education	133.3 (300)	270.0 (100)	167.5 (400)
Total	99.1 (807)	271.0 (107)	119.2 (914)
Some antenatal care	53.6 (261)	400.0 (10)	66.4 (271)
No antenatal care	121.8 (550)	250.0 (100)	141.5 (650)
Total	99.9 (811)	263.6 (110)	119.4 (921)

Note: All differences are statistically significant ($p < 0.01$) except those between smokers with some or no education and between smokers with some or no antenatal care. Mean years of education: 5.6 for nonsmokers; 0.3 for smokers. Mean number of antenatal visits: 1.6 for nonsmokers; 1.2 for smokers.

Source: Begum & Fortney (International Fertility Research Program) (23)

Developing Countries

Research in industrialized countries suggests relatively higher risk of perinatal mortality associated with smoking during pregnancy among women with anemia, older women, and women of high parity. These features are common among childbearing women in developing countries. Thus, the incidence of perinatal mortality among women who smoke during pregnancy could be much greater in some parts of the developing world than it is in developed countries. However, there is very little direct evidence from the developing countries on the effects of smoking on pregnancy. In most countries its potential impact can only be indirectly deduced from the prevalence of risk factors known to be present in the population.

Reports from South Asia, including IFRP data, confirm that the impact of tobacco use on the risk of perinatal mortality is indeed greater in developing countries than in industrialized nations. Among women in Dacca, Bangladesh, with no formal schooling, perinatal mortality rates were more than twice as high for smokers (270 per thousand) as for nonsmokers (133 per thousand). Similarly, among women who had had no antenatal care, perinatal mortality rates were more than twice as high for those who smoked (250 per thousand) as for those who did not (122 per thousand) (23) (see Table 6). Most smokers consumed 1 to 10 hand-rolled cigarettes of strong home-grown tobacco daily. Hemoglobin levels in the smokers, 94 percent of whom were without education, averaged 8.6 grams per 100 ml compared with 9.6 for nonsmokers — both levels that would be classified as anemia (79). Although not conclusive, these IFRP data suggest that for impoverished women with high rates of anemia even light smoking of locally grown products may have a more adverse impact on perinatal mortality than studies in developed countries would predict.

In the Dacca population, 25 percent of the women with no education were smokers. In Maharashtra, India, tobacco chewing was far more prevalent than smoking among pregnant women participating in a maternity hospital study. The exceptions were the two highest social classes, where the habit was totally absent. The stillbirth rate for tobacco chewers was 50 per thousand births, in contrast with 17.1 per thousand for nonusers (131). The study did not control for social class in its reporting of stillbirth rates. However, if all women in the higher, nonchewing classes were eliminated from rate calculations, the stillbirth rate for tobacco chewers would, nonetheless, still be more than 2½ times as great as for the nonchewers. Thus the data so far available suggest that tobacco use may cause higher rates of perinatal mortality in developing countries due to the prevalence of other risk factors.

Anemia may be the single most important consideration. As mentioned, anemia nearly doubles the risk of perinatal death for offspring of women who smoke 20 cigarettes or more daily (169). Although data on the distribution of various nutritional anemias are scarce, the high prevalence of anemia and iron deficiency among pregnant women in the developing countries is widely acknowledged. For example, IFRP data for 1976 and 1977 showed 45 percent of women admitted for delivery in Ibadan to have hemoglobin levels of 10 grams or less per 100 ml of blood (26). A study in seven Latin American countries of nutritional anemia and iron deficiency among women in their last trimester of pregnancy found that 38.5 percent had hemoglobin levels less than 11 grams per 100 ml of blood, the World Health Organization's criterion for anemia (44). Anemia brought about or aggravated by such disorders as hookworm or malaria may also interact with smoking.

Certain vitamin deficiencies may also have important implications for tobacco's effects upon health in pregnancy. Smoking during pregnancy decreases levels of vitamins B_{12} and C (150, 220). This may in turn affect tissue health. More research is needed to determine if the effect of smoking on vitamin levels reduces the quality and strength of maternal reproductive tract tissues required for a healthy childbirth (259). Because vitamin B_{12} in particular is usually available only in meat and dairy products, the effects of smoking might be more severe where such vitamin sources are scarce.

Smoking adds especially to the risk of perinatal death in the pregnancies of older women and women who have had three or more children. Data from Quebec show a risk from smoking to high-parity women that is two-thirds greater than the risk to comparable nonsmokers (73). Given the high prevalence of births at high parity and in later years among developing country women, these factors also could mean more risk of perinatal loss. In a number of developing countries, tobacco use is more common in older women (11, 22, 163, 170), perhaps because age and motherhood give them more autonomy. In such cultures, the women most likely to use tobacco would thus be among those whose pregnancies would be most endangered by smoking.

When evaluating the dangers of smoking to pregnancy in developing countries, the limits of health care delivery systems should also be taken into account: less than optimal obstetric and pediatric care further reduces the margin of protection against perinatal mortality (9, 40). In many areas of the developing world obstetric and pediatric facilities are overtaxed or lack the technology needed to save premature infants. The antenatal care important to avert perinatal deaths from maternal toxemia (38) is often lacking as well. As noted previously, the smoking mother whose pregnancy is complicated by toxemia is in greater danger of losing her child than the toxemic nonsmoker. In cases of placental complications, more frequent in smokers than nonsmokers, the woman's life as well as her child's is in danger and is more likely to be lost if skilled care and medical facilities are not available.

INFANT HEALTH AND DEVELOPMENT

For offspring, the health consequences of parental smoking may go beyond the effects of maternal smoking on pregnancy outcome. Breast milk from smoking mothers, prolonged exposure to tobacco smoke in the home, and the latent or lingering effects of exposure during gestation may adversely affect the health of smokers' children. Children whose parents smoke are also more likely to take up smoking at an early age themselves.

Congenital Malformations

Although a cause-and-effect relationship between smoking during pregnancy and congenital malformations has not been established, fragmentary evidence suggests that further study may be worthwhile. One indication of physical abnormalities comes from the laboratory research of I. Asmussen in Denmark, who has studied the tissues of umbilical arteries and veins from infants of smoking and nonsmoking women. Her investigations reveal severe vascular damage in the specimens from smokers, suggesting similar changes in the blood vessels of their newborn children (16, 17). The inner walls of umbilical arteries from pregnant smokers showed surfaces with an abnormal "cobblestone appearance," a pattern that was more irregular in mothers who smoked more than 20 cigarettes per day than in light smokers (17). Asmussen hypothesizes that such damage could lead to coronary heart disease later if present in the newborn (17).

Epidemiologic studies designed to find a relationship between smoking and congenital malformations often suggest an association between smoking and birth defects but do not point consistently to the same malformations. A recent study in Connecticut (USA) involving 1,370 births of abnormal infants and 2,968 controls found a 10 percent increase in risk of malformations in the infants of women who smoked more than 10 cigarettes daily; risk rose with cigarette consumption, reaching a 90 percent difference in risk for smokers of more than 30 cigarettes a day. Increased risks were estimated to be highest for pyloric stenosis, digestive tract abnormalities, and inguinal hernia, but the researchers concluded that there was a general elevation in risk of all malformations rather than one specific to certain malformations (126).

Data from the British Perinatal Mortality Survey show a higher incidence of congenital heart disease in smokers' children — 7.3 per thousand births compared with 4.7 per thousand in nonsmokers' babies (75). The Child Health and Development Study of Oakland, however, found no increase in congenital heart disease among smokers' children (281). Naeye's study of perinatal deaths in the Collaborative Perinatal Project discerned a much higher frequency of anencephaly (failure of the brain to develop) among smokers of more than 10 cigarettes per day (185). Cardiff Births Survey results do not produce evidence of increased anencephaly among smokers' births, but the total incidence of abnormalities is significantly higher among smokers' infants (12). Data on congenital abnormalities among live births derived from a mail survey of US female medical specialists found a significantly higher rate of abnormalities reported by smokers in all 5-year age groups. Differences between smokers' and nonsmokers' abnormality rates for cardiovascular, urogenital, and gastrointestinal defects were the least likely to be due to chance (111). Other studies examining the possibility of a relationship between tobacco use and birth defects have found none (18, 43, 133, 223, 301).

Lactation

Smoking during lactation may reduce the quality of breast milk, by introducing undesirable chemicals, and, perhaps, also reduce the quantity a mother is able to produce.

If mothers smoke during lactation, their milk contains nicotine that is passed along to their infants (209, 266). A lactating mother smoking over 20 cigarettes daily could in rare cases cause nausea, diarrhea, and vomiting in her infant (266). The observation that smoking mothers excrete tobacco smoke components in their breast milk was first made over 50 years ago (104), but modern agricultural practice has since added another possible risk to such a transfer of chemicals: the lactating mother who smokes passes along more DDT to her infant than the nonsmoking mother. A study of 55 human milk samples, 10 of them from smokers, showed significantly higher levels of DDT in smokers' milk, levels which rose with amount smoked. The researchers were unable to determine whether the increased DDT came from tobacco, from other sources in the mothers' bodies, or from a combination of both (33).

In laboratory studies of rats, nicotine has reduced milk production by blocking the release of prolactin (30). P. Underwood and colleagues, reporting on 4,440 histories of breast-feeding in first pregnancy, found higher percentages of smokers than of nonsmokers claiming inadequate milk in two of three socioeconomic groups studied. The differences did not attain statistical significance, however (241). The 1979 US Surgeon General's report cites anecdotal evidence of smoking interfering with milk production and notes the need for studies of larger populations of smoking and nonsmoking women (259).

Table 7. Infant Pneumonia and Bronchitis, by Parents' Smoking Habits, London, 1963-1969

Parental Smoking Habit	No. of Cases	Annual Incidence per 100 Children
Both nonsmokers	372	7.8
One smoker	552	11.4
Both smokers	478	17.6
Both or either exsmokers, or habit changed	675	9.2
All	2,077	11.5

Source: Colley et al. (42)

Health Problems in the First Year of Life

The smoking habit of both parents can damage the health of infants by exposing them to tobacco smoke in the home. The involuntary inhalation of tobacco smoke has become a prominent concern in the United States and other Western countries as evidence has accumulated that tobacco smoke can affect the health of bystanders (97).

Research points to higher rates of bronchial illnesses in the infants of smokers. In a West Jerusalem study of 10,672 infants, rates of hospital admission for bronchitis and pneumonia were significantly higher for infants under one year of age whose mothers smoked than for infants of nonsmokers — 13.1 cases per 100 infants compared with 9.1. The rate of admissions was positively associated with the number of cigarettes smoked by the mother (102). A London study of 2,077 infants in the first five years of life found a significant relationship between parental smoking habits and infant bronchitis and pneumonia. The association was strongest when both parents smoked, lowest for nonsmoking parents, and intermediate when one parent smoked (see Table 7). These ill effects appear to be most acute during the first year of life: while parental cigarette smoking was associated with a twofold increase in the incidence of bronchial infection during the first year, it was not consistently associated with this ailment after the age of one year (42).

Smoking has been implicated in Sudden Infant Death Syndrome (SIDS, or SUD, Sudden Unexpected Death), an as-yet-unexplained phenomenon that typically involves pulmonary inflammation but insufficient pathological evidence to account for death (230). Comparing 125 cases of SIDS in the Collaborative Perinatal Project with 375 matched controls, Naeye and colleagues found that maternal smoking was more prevalent during the gestation of the SIDS babies (59 percent of SIDS mothers, 48 percent of controls). Some 46 percent of the SIDS mothers smoked six or more cigarettes a day whereas only 25 percent of the controls did. Both differences attained statistical significance. The researchers noted that a larger proportion of SIDS victims than of controls was mildly underweight for gestational age (186). A Seattle study of 56 SIDS families found that a greater proportion of the mothers smoked both before and after delivery than did the mothers in the 86 control families. While 61 percent of the SIDS mothers smoked during pregnancy, only 42 percent of controls did, and after birth the percentages of mothers smoking were 59 and 37, respectively. The differences were statistically significant. In addition, SIDS mothers smoked a greater number of cigarettes than the controls (25). A Canadian investigation of 66 families experiencing sudden infant death also discovered that the cases' mothers were more likely to have smoked during pregnancy than were controls' (230).

Subsequent Development

Children of smokers may run a risk of being slightly physically and intellectually disadvantaged in comparison with children of nonsmokers. In their physical development, children of women who smoked during pregnancy have failed to attain the height for age of nonsmokers' children. At ages five (273), six-and-one-half (63), and seven (92), the heights of smokers' children averaged about one centimeter less than nonsmokers'. Not all of these differences proved statistically significant; J.B. Hardy and E.D. Mellits, on the basis of their study of 143 pairs of smokers' and nonsmokers' children, rejected the possibility of long-term effects (101). The direction of the results of all of these studies of growth, however, is consistent. Analysis of data from the British National Child Development Study

A Trobriand Island woman smoking a homemade, leaf-wrapped cigarette. (Richard Harrington/Camera Press)

suggests that long-lasting effects of smoking on growth may not be solely the result of low birth weight; after controlling the data of 7-year-olds for birth weight researchers found that an average difference in height of 1.0 cm between smokers' and nonsmokers' children persisted (92).

Some researchers suggest that deficient neurological and intellectual development of offspring may be associated with smoking during pregnancy (39, 52, 64, 188). The British National Child Development Study provides the largest body of cohort data, with follow-up at ages 7 and 11 of several thousand children of smoking women (39, 52). After allowance was made for six other factors, 7-year-old children of mothers who had smoked 10 or more cigarettes a day during pregnancy were four months behind nonsmokers' children in reading ability. Of the seven factors, social class, birth order, number of younger siblings, the sex of the child, and birth weight, in that order, had more effect upon reading ability than smoking, and the age of the mother had less effect (52). At the age of 11, the children of heavier smokers (10 or more cigarettes per day) were tested again, this time for reading, mathematics, and "general ability." They fell behind children born to nonsmoking women by 4, 5, and 3 months in each of the areas, respectively (39). The researchers, while noting that such factors as number of children in the household could influence results by as much as 16 months and that smoking-associated personality factors were not taken into account, nevertheless suggested that parental smoking is an independent factor in intellectual development (39).

Extreme caution is required in interpreting these findings on intelligence, because many environmental factors shape a child's intellectual development, among them parental behavior patterns that may also be related to smoking (64). Longitudinal studies of intelligence are especially difficult, not only because selection of the variables to be measured must anticipate such confounding factors, but also because changes occur in the child's environment during the long course of the project (59). Nevertheless, should children be impaired, however slightly, by smoking during pregnancy, the consequences for human development would be far reaching; the possibility makes further study important.

Smoking parents endanger their children's health by their example as well as by their behavior: the children of smokers are more likely than the children of nonsmokers to take up smoking themselves (254, 302). In a US survey, in homes where both parents smoked teenage boys were twice as likely to smoke and girls were almost three times as likely to smoke as in homes where neither parent smoked (253). In a survey in Rochester, New York, girls again proved particularly influenced by parental smoking. For both sexes, both parents smoking had a stronger influence than only one parent smoking. The youngest smokers were the most likely to imitate their parents. White girls under age 15 were five times as likely to smoke if both their parents smoked than if neither parent smoked. Boys under age 15 were twice as likely (302).

Young smokers like these exhibit the symptoms of smoking early. English children aged 10 to 12½ who smoked were more likely to cough than nonsmokers even though most smoked an average of fewer than one cigarette a day (288, 289). The secondary school students in Rochester, an older group, exhibited respiratory symptoms increasingly with the amount they smoked. Heavy smokers (15 or more cigarettes a day) reported coughing on arising at 10 times the rate of nonsmokers, and cough and phlegm were more chronic in heavier smokers (215, 302).

TOBACCO AND OTHER ASPECTS OF REPRODUCTION

While research has focussed on the effects of tobacco use on the health of the pregnant woman and her offspring, there is also evidence that smoking may affect other aspects of male and female reproductive health as well. Smoking may bring on menopause at an earlier age. Smoking and oral contraceptive use combined markedly increases the risk of developing certain vascular diseases. The possibility of links between tobacco and cervical cancer deserves further investigation. It has also been suggested although not proved that sperm quality may be adversely affected by tobacco use.

Menopause

Earlier menopause due to smoking, first seen in small studies (49), has recently been confirmed in two large-scale studies. In 1977, H. Jick and colleagues reported an association between smoking and early age of natural menopause in two large sets of data, one covering 2,143 patients, aged 44 to 53, in Boston-area hospitals, the other covering 1,391 patients in the same age group from hospitals in seven countries. The data from Boston and from each of the seven countries showed greater percentages of smokers than nonsmokers among the postmenopausal in each two-year age group between 44 and 53.

Table 8. Age-standardized Proportions of Postmenopausal Women Aged 44-53, by Smoking Status

Smoking Status	Boston Hospital Study		Seven Country Hospital Study	
	No. of Women	% Menopausal	No. of Women	% Menopausal
Never smoked	921	35	697	53
Ex-smoker	301	36	138	59
10 cigarettes/day	216	43	190	60
20 or more cigarettes/day	705	49	366	65
Total	2,143		1,391	

Source: Jick et al. (120)

Furthermore, age-standardized groupings of women by smoking status in both data sets revealed that the percentage of postmenopausal women increased with the amount smoked: ex-smokers ranked between nonsmokers and smokers of 10 cigarettes or more per day (120) (see Table 8). A Swedish study of a randomly drawn sample of women aged 46, 50, and 54 found a significantly higher percentage of smokers among 50-year-old postmenopausal than among premenopausal women. Similar but not significant trends were seen in 46- and 54-year-old groups (141). In both of these studies, the researchers were able to reject the possibility that the women in their samples began smoking as a result of menopause. To explain the association between smoking and earlier menopause, both research groups point to steroid metabolism: smoking might increase the liver's metabolism of estrogens; thus smokers might experience an earlier fall in estrogen levels that in turn brings on menopause (120, 141). Another possible explanation is suggested by recent research showing that benzo(a)-pyrene, one of the carcinogenic ingredients in tobacco smoke, destroyed oocytes in the ovaries of mice; the menopause in humans occurs as the ovarian stores of oocytes are depleted, and a similar process might be operating in women who smoke (155). One other hypothesis involves amount of body fat: noting that studies have found a higher incidence of obesity among nonsmokers and later menopause among obese women, H.W. Daniell examined data for 500 women interviewed in his private practice. He found that some but not all of the difference in average age at menopause was due to differences in weight between the smokers and the nonsmokers (49).

Contraception and Conception

The effects of tobacco on the circulatory system in women have received new attention as a result of research on the safety of oral contraceptives (OCs). Both case-comparison and cohort studies show that women who smoke and at the same time use oral contraceptives face an increased risk of cardio- and cerebrovascular disease, especially myocardial infarction and subarachnoid hemorrhage (119, 193, 199, 214, 263). Further, using OCs and smoking may not merely combine independent risks, but in fact multiply the risks so that women who use OCs and smoke may face a risk of circulatory system disease as high as 10 to 20 times that of nonsmokers who do not use OCs (81, 193, 199). Older age (over 35) and other predisposing factors add still further to the risk. Thus women, who normally seem to be at lower risk than men for tobacco-induced heart disease, may face equal or even higher risk if they use oral contraceptives. (An extensive review of current research on oral contraceptives and smoking is provided in **Population Reports** A-5, January 1979.)

In the course of research on the fertility of almost 2,000 women after they discontinued using oral contraceptives, diaphragms, and other contraceptive methods, M. Vessey and colleagues found an indication of reduced fertility (indicated by a longer average interval between stopping contraceptive use and giving birth) among women who smoked 15 or more cigarettes daily (264), but the effect was very weak (279). In the Jerusalem Perinatal Study, involving a larger sample, no such effect was seen, regardless of number of cigarettes smoked (103).

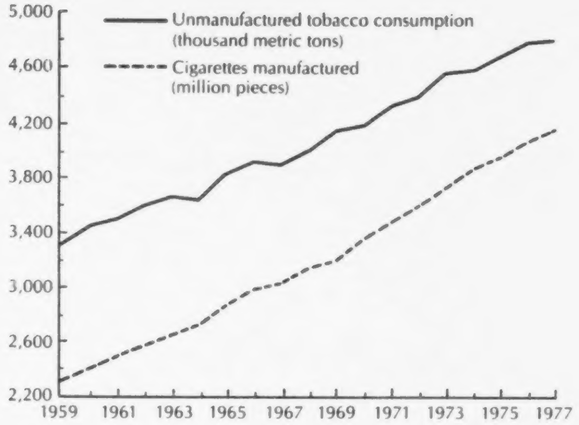
The possibility that smoking increases the chances of cancer of the reproductive organs is also now receiving attention. Analysis of (US) Third National Cancer Survey data by R.R. Williams and J.W. Horm revealed a statistically significant association between invasive cancer of the uterine cervix and cigarette smoking, with rates increasing as cigarette consumption increased (270). A smaller study conducted in 1963 also found an association with smoking. Although no dose-response relationship was seen, those who had stopped smoking had a rate of histologically confirmed cases of cervical neoplasia lower than for current smokers but higher than for those who had never smoked (187). In neither study, however, were the researchers able to control for differences in sexual behavior, especially age at first coitus, that are known to affect risk of cervical cancer and may also be linked to cigarette consumption (204). In a study of 324 cases showing cytological signs of cervical neoplasia and 302 controls, the researcher found the association between cigarette smoking and cervical carcinoma in situ, the predecessor of invasive cancer, to be of "borderline significance." The research design controlled for 13 possible confounding variables, among them premarital conception of first child and first pregnancy before age 20, but age at first coitus was not included (237).

Male Fertility

Much of the early research on the health effects of tobacco focussed on males because at the time only males smoked extensively, but there has been little attention paid to the possible impact of tobacco use on male reproductive capacity. Research in Budapest on 120 smokers and 50 nonsmoking controls discerned a reduction in the proportion of motile sperm for smokers that was related to number of cigarettes smoked: men smoking more than 30 cigarettes a day showed 49 percent motile sperm; men smoking 10 or fewer cigarettes a day, 57 percent; and controls, 69 percent. The incidence of deformed sperm was significantly greater among the men who smoked the most and for the longest periods of time (265). Since the researcher chose the smokers from a group of men being treated for sexual, hormonal, or reproductive disorders,

> **"Tobacco, divine, rare, superexcellent tobacco, which goes far beyond all the panaceas, potable gold, and philosopher's stones, a sovereign remedy to all diseases . . . but as it is commonly abused by most men, which take it as tinkers do ale, 'tis a plague, a mischief, a violent purger of goods, lands, health, hellish, devilish and damned tobacco, the ruin and overthrow of body and soul."**
>
> **Robert Burton (1577-1640)**

Figure 7.
World Unmanufactured Tobacco Consumption and Cigarette Production, 1959-1977



Source: US Department of Agriculture (247)

both the validity of the results and their applicability to a healthy male population are questionable, however.

In similar research conducted in Prague, semen from 429 men was classified as of normal sperm quality, of reduced sperm concentration, or azoospermic. The proportion of heavy smokers (20 or more cigarettes a day) rose as sperm concentrations fell: 9.5 percent of the men with normal sperm were heavy smokers, as were 12.5 percent of those with reduced sperm counts and 15.5 percent of those whose semen was classified azoospermic (204). All the men were examined because their marriages were infertile. Research that studies the sperm of large groups of smokers and nonsmokers who are not selected for possible fertility problems will be needed to determine more clearly whether smoking has an effect on sperm.

An Australian study found levels of plasma testosterone 16 to 47 percent lower in six healthy male smokers of 30 or more cigarettes a day than among their individually matched nonsmoking controls. After seven days of refraining from smoking, all of the smokers' testosterone levels rose significantly (35). Whether low testosterone levels mean lower fecundity is not known (231). As a rule, testosterone levels must be severely lowered before any appreciable effects on sperm production occur (69). Men being treated for various illnesses, among them infertility, have reported increased sexual activity after giving up smoking (191, 235), but comparable studies have not been undertaken with a normal, healthy population. Since human sexuality involves a large number of physical and psychological variables, conclusions based on these limited observations would be unwarranted. Even if tobacco lowers testosterone levels appreciably, there is no clear-cut relationship between sexual drive and testosterone concentration that would permit predictions of sexual behavior (69, 231).

The cancers of male reproductive organs were not significantly associated with tobacco use in the Third National Cancer Survey. A "suggestive" association appeared, however, between cancer of the testis and all forms of tobacco use other than cigarette smoking (270).

With the exception of data on earlier menopause and on oral contraceptives, the information on the involvement of tobacco use with aspects of reproductive health other than pregnancy and childbearing does not yet lead to conclusions. It does, however, suggest the need for further research on a wide variety of issues involving smoking and reproductive and sexual health.

WORLDWIDE USE OF TOBACCO

Despite mounting evidence of the health hazards of tobacco use, the worldwide growth, manufacture, and use of tobacco are increasing. An estimated 4.9 million metric tons (dry weight) were produced in 1977 (247). Although this was a slight decrease from the record 5 million ton yield of the year before, the manufacture of cigarettes increased, despite rising cigarette prices in many countries (246). The increase in cigarette manufacturing continues long-term trends toward more tobacco consumption, both in absolute amount (see Figure 7) and per capita (see Table 9).

Tobacco production is increasing more rapidly in the developing world than in the industrialized countries. Data from the

Table 9. Annual Cigarette Consumption Per Person Aged 15 and Older, Selected Countries, 1935, 1950, 1965, and 1973

	Consumption Per Adult			
Developed Countries	**1935**	**1950**	**1965**	**1973**
Australia[a]	450	1,280	2,680	3,080
Canada[a]	700	1,790	3,310	3,450
Denmark	470	1,290	1,500	1,850
France	530	930	1,510	1,920
West Germany	—	630	2,100	2,610
Japan	880	1,220	2,350	3,240
Sweden	380	810	1,360	1,580
United Kingdom	1,590	2,180	2,680	3,230
United States	1,450	3,240	3,800	3,850
Developing Countries				
Argentina	1,060[b]	1,460	1,660	1,940
Barbados	—	—	1,110	1,620
Brazil	600[c]	1,140	1,220	1,490
Chile	—	—	1,220	1,320
Costa Rica	—	—	1,850	2,060
El Salvador	—	—	750	1,020
Ghana	—	—	480	480
Hong Kong	—	—	3,310	2,780
India	80[d]	100	180	170
Indonesia	—	—	—	230
Jamaica	—	—	1,270	1,350
Kenya	—	—	390	470
Malawi	—	—	150	200
Malaysia	—	—	1,440	1,600
Mauritius	—	—	1,610	1,920
Mexico	1,440	1,510	1,510	1,360
Morocco	240	510	570	690[e]
Nicaragua	—	—	1,140	1,520
Pakistan	—	—	450	760
Sierra Leone	—	—	280	430
Singapore	—	—	2,380	2,490
Turkey	960	1,220	1,820	2,050[e]
Venezuela	—	—	1,900	2,210

[a] Handrolled cigarettes not included; add about 10 percent to total consumption.
[b] Figures are for Year 1940.
[c] Annual averages for 1935-1939
[d] Figures are for Year 1948.
[e] Figures are for Year 1972.

Source: Lee (135)

UN Food and Agriculture Organization show that tobacco production in the developing world rose by 28 percent between 1969-1971 and 1977, while in the developed countries it rose 15 percent (243). In 1977, some 60 percent of the world's tobacco was grown in the developing world, up from 57 percent in 1969-1971 (243). In a recent four-year period, the number of cigarettes manufactured in eight major producing nations of the developing world rose by about 12.7 percent, while in five major industrialized producer nations it rose only 2.4 percent (243) (see Table 10). Of the world's top 10 tobacco producers, six are in the developing world — China, India, Brazil, Turkey, Korea, and Indonesia (see Table 11).

With the important exception of China, most of the developing countries are increasing the acreage allotted to tobacco, both for domestic consumption and for export. China, the world's largest producer, raised almost 900,000 metric tons in 1977 but exported only 35,000 metric tons, or about 4 percent. Of the production of the next 10 tobacco-raising developing countries, over 500,000 metric tons, or about one-third, were exported. The rest was used for domestic consumption, which is now increasing by about 5 percent annually (247).

Among developed countries, the United States is by far the largest exporter — as well as consumer — of tobacco, and US exports are growing. In 1977, the United States exported a record high $1.73 billion worth of tobacco and tobacco products — about one-third of the US crop. Of these exports, approximately two-thirds went to Europe, Japan, Hong Kong, and the Middle East, but there is increasing demand in the developing world for the high quality, flue-cured US tobaccos to blend with indigenous strains.

The statistics on tobacco production, import, and export can be used to suggest national levels of tobacco consumption.

Table 10. Estimated Number of Cigarettes Manufactured by Selected Major Producers, 1974 and 1977

	Output (in million pieces) 1974	Output (in million pieces) 1977	Percent Change
Developed Countries			
Germany, F.R.	139,842	137,000	-2.0
Japan	292,157	297,000	1.7
Soviet Union	371,000	380,000	2.4
United Kingdom	158,809	154,625	-2.6
United States	635,000	665,871	4.9
Total	1,596,808	1,634,496	2.4
Developing Countries			
Brazil	100,329	129,000	28.6
China	671,000	729,000	8.0
India	62,400	67,807	8.7
Indonesia	49,907	64,827	29.9
Korea, South	49,323	60,000	21.6
Mexico	43,125	47,500	10.1
Philippines	41,453	51,373	23.9
Turkey	54,433	58,200	6.9
Total	1,071,970	1,207,707	12.7
World Total	3,849,656	4,126,452	7.2

Source: US Department of Agriculture (246)

However, not all the tobacco consumed in developing areas is in commercially prepared form. Much of it is grown in backyard plots and so is not reflected in marketing statistics. In Latin America, however, home tobacco gardens have begun to disappear as commercial channels for cigarette marketing have developed, a process that may be repeated elsewhere (233). Such a shift means that meager cash incomes may be increasingly diverted to tobacco from other, more essential purchases.

Table 11. Tobacco Production and Consumption in Major Developed and Developing Producer Countries, 1960, 1970, 1977 (in thousand metric tons dry weight)

	1960		1970		1977		Change in Area Harvested 1960-1977[a]
Developed	**Prod.**	**Cons.**	**Prod.**	**Cons.**	**Prod.**	**Cons.**	
***United States**	805	714	780	625	782	604	–
Soviet Union	160	226	233	299	270	361	+
Japan	109	124	135	192	156	220	S
***Bulgaria**	56	14	110	55	135	78	S
***Canada**	87	50	91	66	94	80	S
***Italy**	61	62	67	76	92	75	+
Poland	37	44	77	69	85	91	+
***Yugoslavia**	25	23	44	32	58	44	+
Developing							
China	592	538	694	733	878	877	S
***India**	274	259	317	283	389	314	+
***Brazil**	133	96	174	101	272	165	+
***Turkey**	118	34	130	47	206	68	+
***Korea, South**	27	28	53	53	134	54	+
***Indonesia**	63	57	93	48	110	75	S
***Greece**	59	12	81	17	107	24	+
***Argentina**	41	40	66	51	90	66	+
***Philippines**	60	25	93	48	78	73	+
***Pakistan**			80[b]	85[b]	69	59	
***Thailand**	26	25	41	40	65	54	+
Burma	34	41	31	45	64	66	S
***Mexico**	39	38	57	43	59	43	S
Bangladesh			30[b]	35[b]	54	52	

* = Net exporter, 1977

[a] Change in area harvested is designated by S = no change, + = an increase, – = a decrease.

[b] 1972 data

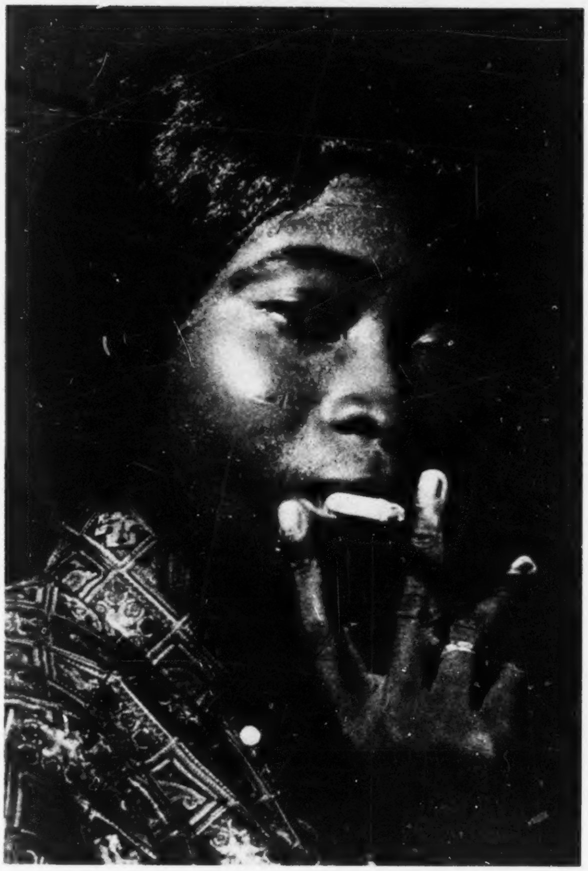
Source: US Department of Agriculture (247)

Generally speaking, a country's level of tobacco consumption reflects the affluence of its people (65, 194). Thus, while per capita consumption in the developing world is less than in developed countries (see Table 9), it can be expected to rise wherever economic development occurs, since development creates both discretionary cash income for the purchase of cigarettes and the channels of communication and commerce through which tobacco can be further promoted and distributed. Also, population growth in the developing countries has created a large potential market of young adults. A tobacco industry analyst in the US has noted that the so-called world market for the industry is five times as large as the US market and is growing over 2.5 times as fast (194).

Three of the top five cigarette producers are government monopolies, in China, the Soviet Union, and Japan, but in the rest of the world the large private multinational companies such as the British-American Tobacco Company, R.J. Reynolds, and Philip Morris Inc. have not been slow to see opportunities for growth in the developing countries. Whereas restrictions and educational efforts in developed countries have forced them to spend more and more on advertising merely to maintain existing consumption levels, such barriers are still absent in most developing nations (65, 116, 194). Tobacco companies are taking advantage of this relative freedom. In Kenya, for example, the nation's only cigarette company is its fourth largest advertiser. The promotion appears to be successful: cigarette consumption is growing at a rate of 5 to 10 percent per year (179).

The patterns of tobacco use in the developing world resemble those of other Western consumer products. Latin American countries generally have the highest rates of tobacco use, whereas the countries of Africa have the lowest (65, 135). Use rates in much of Asia are intermediate. The differences are partly the result of lower levels of discretionary spending in Africa and much of Asia (65). Smoking is more prevalent in urban than in rural areas (22, 65), perhaps partly because cash incomes are higher in the cities (179). Also, smoking is being taken up by those who are better educated and have higher incomes (65). In many developing countries smoking is more common among college and university students than among nonstudents, and more students become smokers as they proceed through school (14, 20). The increase in smoking by the well-off and well-educated may encourage its spread to the rest of the population, since advertising campaigns in these countries play upon people's desire to imitate their own elites, just as advertising in the West once played up cigarettes as a symbol of sophistication and high social status (65, 179).

Ironically, while smoking is spreading in the developing countries, and most rapidly among the elites, smoking is decreasing in the US and UK, with the sharpest declines occurring among the best educated. The biggest downturn in smoking rates in the US followed the US Surgeon General's report on the health hazards of smoking in 1964 (258). Between then and 1970 smoking among men dropped from 52 to 42 percent and, among women, from 34 to 30 percent (255); between 1970 and 1975 there was a further decrease to 39 percent by men and 29 percent by women (256). In the US a smaller than average proportion of well-educated men are smokers — in 1975 some 28 percent of male college graduates (256). In the UK cigarette smoking by men dropped off sharply after the 1962 publication of the Royal College of Physicians' report, *Smoking and Health*. The higher a man's social class, the more likely he is to have given up smoking (179, 214). Less smoking among the better-educated has been noted in other developed countries as well (204, 277).



A woman smoking a cigarette may become an increasingly common sight in Africa. (Paul Almasy/Camera Press)

Smoking by Women

Women are less likely to smoke than men. However, sales to young women are increasing in many places (277). In the US, despite an overall decrease in smoking, the proportion of females in their teens who smoked nearly doubled between 1968 and 1974, when it reached more than 15 percent (253). US cigarette advertising aims at women's desire to express their independence and their equality with men. The appeal is ironic, coming at a time when more men are refraining from smoking.

In general, a smaller proportion of women smoke in developing countries than in industrialized nations. Rates vary greatly, however, not only from country to country, but from one ethnic or religious group to another. Over one-fourth of women surveyed in Santiago, Chile, and Caracas, Venezuela, reported smoking, but only 10 percent in Guatemala City and 7 percent in Lima, Peru (121). A survey of almost 25,800 women in India found 41.0 percent using tobacco in some form, with proportions ranging from 14.9 percent to 67.2 percent in the five areas studied (161). In rural Goa, 54 percent of Hindu women and 34 percent of Christian women were found either to smoke or to chew tobacco (28), and a survey in Papua New Guinea reported smoking — mostly of cigars made of locally grown tobacco — to be almost universal among women over age 25, as it was among men (11). By contrast, in urban Sri

Table 12. Rates of Tobacco Use, Selected Countries, 1963-1978

Author & Date	Ref. No.	Location and Population	Percent Current Tobacco Users	
			Male	Female
Africa				
Arya & Fowkes 1971	286	Kampala, Uganda: Makerere University		
		Students, survey, 1970	29.8	5.0
		Non-academic staff, survey, 1971	35.0	5.8
		Kasangati region, Uganda: 4 villages, inhabitants aged 16 years and older, survey, 1971	38.6	18.0
Baylet et al. 1974	22	Niakhar, Senegal: residents of 65 rural villages and migrants to urban area		
		Rural	47.2	11.6
		Urban	55.6	3.1
Elegbeye & Femi-Pearse 1976	68	Lagos, Nigeria: children in secondary schools and medical students at Lagos University, surveys		
		Secondary school students	40.0	8.4
		Medical students	72.4	22.2
Schonland & Bradshaw 1969	219	Durban, South Africa: hospital inpatients, survey, 1964-1966		
		African	63.9	3.6
		Indian	56.2	7.8
Asia				
Anderson 1974	11	Papua New Guinea: 3 rural villages on Karkar Island, inhabitants aged 10 and older, survey	97.0	95.3
Banerjee 1963	20	Calcutta, India: students at colleges, 1962-1963	—— 26 ——	
Bard & Peacock 1976	21	Hong Kong: university students, staff, and staff dependents, cohort study, 1971-1975		
		Senior year students	19.2	6.5
		Staff (aged 17-24)	24.0	2.0
Bhonsle et al. 1976	28	Goa, India: 11 villages, inhabitants aged 15 and over, survey		
		Hindus	74	54[a]
		Christians	52	34
Leung 1977	295	Hong Kong: selected adults, survey	59.0	11.0
Malik et al. 1977	296	Chandigarh, India: hospital visitors, adults, survey	25.6	0.13
Mehta et al. 1969	161	India: rural villages in 5 districts, inhabitants aged 15 years and older, survey		
		Gujarat	70.9	14.9
		Kerala	81.2	38.8
		Andhra Pradesh	80.6	67.1
		Singbhum	80.9	32.6
		Darbhanga	78.1	51.4

Continued on next page

Lanka only 1.6 percent of females questioned reported smoking (260). Few Moslem women smoke; in Pakistan, for example, only 2 percent of smokers are female (179). (See Table 12.)

Women who use tobacco appear to favor traditional forms more than men do. Most of the evidence for this comes from India and Sri Lanka (28, 161, 260), but the same pattern has been reported from Papua New Guinea (11). In F.S. Mehta and colleagues' study of smoking in five areas of India, for example, only between 0.4 and 5.2 percent of all women smoked conventional cigarettes in four of the areas, while from 14.5 to 62.2 percent used tobacco in some traditional form. In the fifth area, however, 41.0 percent smoked conventional cigarettes. Wide variations in traditional practices also were observed. In the Singbhum district of Bihar almost 26 percent of women chewed tobacco, compared with less than 3 percent in Andhra Pradesh. But in Andhra Pradesh 56.6 percent of all women smoked *chutta*, a cigar of coarse tobacco rolled in tobacco leaf or the leaf of the *temburni* tree (127), with the lighted end held inside the mouth to keep it burning. In Singbhum, by contrast, no women smoked *chutta* in reverse (161). The hazards of traditional forms of tobacco use are not well quantified, but they apparently vary with the type of tobacco and the way it is used.

Surveys may underestimate smoking among women. In more traditional communities social pressures discourage women from smoking in public and may lead them to conceal smoking from interviewers (233). Also, traditional forms of tobacco use, including chewing tobacco and smoking locally made cigarettes like *bidi*, may be excluded from or underreported in surveys (79, 260).

Concern about women's smoking focuses not just on individual well-being, but also on the special implications of smoking for reproduction. The US government estimates that 20 to 25 percent of US females smoke during pregnancy (257). Other studies have found rates as high as nearly 50 percent (37, 189, 216) (see Table 13). A comparison of data for women under 25 years of age in the British Perinatal Mortality Survey of 1958 and the Cardiff Births Survey of 10 years later reveals a 50 percent increase in smoking by pregnant women during the decade. In the later study about 45 percent of pregnant women under 25 smoked (12). Studies in Ontario and Quebec,

Table 12 (Continued)

Table 12. Rates of Tobacco Use, Selected Countries, 1963-1978

Author & Date	Ref. No.	Location and Population	Percent Current Tobacco Users	
			Male	Female
Pathmanathan 1974	298	Malaysia: 4 villages in the Negri Sembilan region, inhabitants aged 15 years and older, survey, 1973	56.0	20.5
Pathmanathan 1975	195	Malaysia: University of Malaya medical students, survey, 1972	25.5	1.6
Sehgal et al. 1971	303	Chandigarh, India: urban residents, survey	28.3	
Toda et al. survey, 1968	305	Surabaja City, Indonesia: health center patients, children and adults,	14.8[b]	1.5[b]
Uragoda & Senewiratne 1971	260	Kandy, Sri Lanka: residents aged 15 and over, random sample, 1969	48.2	1.6
Latin America				
Joly 1975	121	Bogota, Colombia: urban residents aged 15-74, stratified sample, 1972	52	21
		Caracas, Venezuela: as above	49	26
		Guatemala City, Guatemala: as above	36	10
		La Plata, Argentina: as above	58	24
		Lima, Peru: as above	48	4
		Mexico City, Mexico: as above	45	17
		Santiago, Chile: as above	47	26
		Sao Paulo, Brazil: as above	54	20
Miller 1974	170	Guyana: all residents aged 35-54 in two adjacent rural villages, survey, 1968	48	4
		Suburb of Kingston, Jamaica: inhabitants aged 15-65, random sample, 1969-1970	56.1	13.9
Developed Countries				
Lee 1976	134	United Kingdom, individuals aged 16 and over, modified quota sample, 1975	61.5	43.4
US Dept. of Health, Education, and Welfare 1976	256	United States, individuals aged 21 and over, random sample, 1975	39.3	28.9
US Dept. of Health, Education, and Welfare 1979	259	United States, individuals aged 17 and over, Health Interview Survey, 1978	37.5	29.6

[a] Three-fourths were tobacco chewers.
[b] 20 or more cigarettes a day

Canada, in the early 1970s found about 43 percent of pregnant women smoking (73, 169).

Smoking during pregnancy already seems to be a problem in Latin America. The large samples of the International Fertility Research Program's Maternity Care Monitoring program suggest that over 20 percent of urban pregnant women are smoking in Latin America compared with 1.6 percent in developing areas of Asia and 0.2 percent in the Middle East and Africa (79). Other studies, of smaller groups, show 20 percent smoking in Caracas, Venezuela (128), and 25 percent among 500 illiterate women in Dacca, Bangladesh (23), but under 2 percent in two locations in India (131, 175) (see Table 13).

K. Krishna's report that over 15 percent of women giving birth in a Delhi hospital chewed tobacco, while less than one percent smoked, suggests that more emphasis needs to be placed on the study of traditional forms of tobacco use in much of the world. For the pregnant woman, the full implications of chewing tobacco rather than smoking are not clear, since it is not certain which components of tobacco smoke are associated with which effects on reproductive health. Krishna observed a higher stillbirth rate and lower average birth weight among the offspring of women who chewed tobacco (131), and nicotine in chewing gum has been reported to alter fetal breathing movements temporarily (90). Further examination of the effects of chewing tobacco on reproductive health appears warranted, and the findings may be of special interest in developing countries.

Variations in Exposure

The form and manner in which tobacco is used determine exposure to tobacco components and, thus, the degree of risk to its user's health. In this regard, probably the most important trend in smoking practices is the shift in developing countries towards smoking commercial cigarettes and away from traditional forms of tobacco use like chewing tobacco, smoking through a water pipe, or smoking hand-rolled cigarettes or cigars of strong local tobacco.

On one hand, this shift offers some health advantages because US tobaccos, for instance, have a lower tar and nicotine content. Western tobaccos are somewhat milder, have fewer im-

Table 13. Percentage of Women Using Tobacco During Pregnancy in Various Areas, Selected Studies, 1969-1979

Author & Date[1]	Ref. No.	Area	Percent Smoking
Developed Areas			
Andrews & McGarry 1972	12	Cardiff, Wales, UK	42.7
Butler et al. 1972	40	England, Scotland and Wales, UK	31.6
Comstock et al. 1971	43	Maryland, USA	37.8
Cope et al. 1973	46	Sydney, Australia	30.1
Fabia 1973	73	Quebec, Canada	43.2
Kullander & Källén 1971	133	Malmö, Sweden	42.8
Meyer et al. 1974	169	Ontario, Canada	43.6
Niswander & Gordon 1972	189	14 US cities	47.6
Rantakallio 1969		Lapland and Oulu, Finland	23.4
Rush & Kass 1972	216	Boston, USA	46.9
Developing Areas			
Fortney 1979	79	Asia, developing[2]	1.6
		Latin America[3]	20.1
		Middle East and Africa[4]	0.2
Kizer 1978	128	Caracas, Venezuela[5]	27.4
Krishna 1978	131	Delhi, India[6]	0.3/15.8[7]
Mukherjee & Mukherjee 1971	175	Simla, India[8]	1.7/67.8[9]

[1] Except as noted, study populations are described in Tables 2 and 3.

[2] Includes Bangladesh, India, Indonesia, Pakistan, the Philippines, and Sri Lanka; number of women studied: 14,925.

[3] Includes Brazil, Chile, Colombia, El Salvador, Honduras, Mexico, Panama, Uruguay, and Venezuela: number of women studied: 68,035.

[4] Includes Egypt, Iran, Nigeria, Sudan, and United Arab Emirates; number of women studied: 78,803.

[5] Population: 2,095 women receiving prenatal care or giving birth at a Caracas hospital, March 1966-January 1967

[6] Population: 1,393 women delivered of single infants without gross abnormalities, Pune Hospital, June 1971-May 1972

[7] Smoking/chewing tobacco

[8] Population: 2,886 consecutive women giving birth in a Simla hospital, January 1963-June 1969

[9] Women of high social status/wives of semiskilled and unskilled laborers

purities, and are often rolled into filter-tipped cigarettes. Western cigarettes are also more expensive, thus perhaps reducing per capita consumption.

Smoking Commercial Cigarettes

On the other hand, there are special health hazards in shifting to commercial cigarettes: traditional forms may be less dangerous because the smoke is not usually inhaled (116, 277). In the case of the water pipe, or *hookah*, in common use in Asia, water may remove nicotine and tar (277). Switching to commercial cigarettes encourages inhaling, since their tobacco is milder than those traditionally grown in most of the world (179), and once people learn to inhale they may tend to do so even when smoking stronger tobacco (134).

Also, there is some evidence that the commercial cigarettes sold in some developing countries are stronger than those sold under the same brand names in the industrialized nations. Muller reports that the tar content of four brands of cigarettes produced in the Philippines was 1.6 to 2.2 times higher than the average for cigarettes bearing the same brand names that were tested in the US, the UK, and Australia (179).

In smoking, as is the case in other matters affecting health, the poor often find themselves at the greatest disadvantage. Less affluent smokers usually inhale more of each cigarette as an economy measure. For instance, Rhodesian researchers believe that Africans' habits of inhaling more and smoking each cigarette to the end contribute to the incidence of lung cancer even though they smoke relatively few cigarettes (89). By smoking unfiltered cigarettes and resorting more often to hand-rolled, lower grade tobaccos, low income smokers may increase their exposure to tar and nicotine. In India, filter-tipped cigarettes account for less than one-fourth of total production (232, 246). In fact, the most common Indian cigarette is *bidi*, which uses the leaf of the *temburni* tree as wrapper. About 250 billion were produced in 1977 (246). *Bidi* smoke contains a higher concentration of carcinogenic hydrocarbons and toxic agents than even the smoke of US nonfilter cigarettes (113).

While the patterns and forms of smoking in developing countries are varied and specific data are scarce, the broad trends are obvious: more people are smoking, and they are smoking in more hazardous ways. The question is not whether these trends will show up in national death rates, but how soon.

POLICY IMPLICATIONS

The health implications of smoking have been widely publicized in the developed world. By 1979 about two dozen developed countries, including Australia, New Zealand, Japan, the United States, the Soviet Union, and many European nations, had begun to introduce restrictions on smoking. But the financial and agricultural policy implications of heavy tobacco use have received far less attention. The United States, for instance, subsidizes tobacco growing at home and sales overseas while at the same time supporting anti-smoking campaigns at home. Many developing countries, spurred on by promotion from the multinational tobacco companies, are increasing tobacco production both as a valuable export crop for foreign exchange and to meet growing domestic demand. Health professionals throughout the world have a special responsibility to inform themselves and those they work with of the need both for individual decisions and government policies that take account of the hazards of tobacco use.

Benefits and Costs of Tobacco Use

Any assessment of tobacco policy must take account of the claimed economic benefits of tobacco use as well as the health-related costs. As Table 11 shows, tobacco is an increasingly important crop in many developed and developing countries. Tobacco is easy to grow and provides a ready source of cash to the small family farmers who still constitute most of the world's producers. Manufacture and wholesale distribution are largely in the hands of multinational corporations or of government monopolies that cooperate with the commercial firms and provide in most cases for orderly — and profitable — promotion and marketing. As an export product, tobacco makes an important contribution to foreign exchange. As a domestic consumer product, tobacco is one of the most heavily taxed of all commodities.

Table 14. Estimated Economic Returns Attributable to US Tobacco and Tobacco Products, 1976 and 1977 (in $ Millions)

	Receipts	Value Added	Income	Wages	Other Costs
Farmers*	2,225	1,300	700	600	970
Marketers	2,300	75	30	20	25
Processors	2,700	228	90	67	71
Exports*†	1,731	50	16	17	17
Manufacturers	4,200	1,500	600	600	300
Distributors**	12,900	7,400		2,000	
Taxes*	6,200				

Consumer Expenditure* = Income Generated* + Taxes*
$17,000 = $10,800 + $6,200

*1977 figures; others are 1976 figures.
†Imports in 1977: $373
**Excluding taxes

Source: Miller (US Department of Agriculture) (173)

The tax revenues provided by tobacco play an important role in public policy. Less resented than income or property levies, they are far easier to collect. Moreover, they provide considerable sums of money. In Britain, for example, about 70 percent of the price of a package of cigarettes goes to the government (65). In China a 60 percent tax is levied on cigarettes (154). In the Philippines tobacco revenues are said to provide nearly half of government revenues (4). In Tanzania payments from the government tobacco monopoly cover the entire national health budget (179). And in a number of other countries taxes or other payments to government help to insure high level influence (179). Finally, millions of retailers pocket high profit margins for the sale of cigarettes, sometimes sold two or three at a time. Also, they welcome a product that draws consumers in for other purchases.

Yet, in the United States at least, where tobacco was first developed as a colonial product for export, the health costs of domestically consumed tobacco now far outweigh the dollar returns to producers, manufacturers, exporters, and tax collectors (see Tables 14 and 15). While total consumer spending (plus exports) now amounts to about $19 billion and supports jobs for 1.3 million people (173), the cost to US citizens in lost production from sickness, health care, and loss of life and property destroyed by fire totals $27.5 billion (147). This is about 50 percent higher than the income generated and more than four times higher than the taxes collected, even though the taxes alone are approximately triple the receipts to the original farm producer. Incidentally, US domestic tobacco sales are 1½ times the amount spent on all drugs and sundries (173).

In the developing countries, the health costs to society may seem to be lower, but the cost to individuals of a package of cigarettes represents a far greater sacrifice of per capita income. It may be equivalent to the price of meat for a family meal or fresh fruit or vegetables for a pregnant woman. (In fact, smoking often serves as an appetite depressant where food is not available.) Under present conditions of low income, poor nutrition, and limited health care prevailing in many developing countries, tobacco adds an extra burden of health risk.

The land used to raise tobacco is not available to raise food, and this too may contribute to malnutrition and higher mortality. Some 4.4 million hectares, 71 percent of it in developing countries, were devoted to tobacco growing in 1977 (243). Furthermore, tobacco is cured with wood smoke: a tree is burned for every 300 cigarettes produced in the Third World, and an acre of woodland, for every acre of flue-cured Virginia tobacco grown (179). Thus tobacco production aggravates the already critical shortage of firewood in much of the developing world (66).

Cigarette production is a capital intensive industry, the second most intensive in the world, according to F. Clairmonte of the UN Conference on Trade and Development. The US cigarette industry, for example, invests over $108,000 in machinery for each worker it employs (179). Even in developing countries, where technology may be less sophisticated, cigarette manufacturing produces relatively few jobs and consumes scarce capital. Some of this expenditure of financial and natural resources might be recouped by the inflow of foreign exchange. This inflow may be more apparent than real, however. M. Muller, writing for the British organization War on Want, points out that the importation of filters, paper, and packaging for cigarettes can, as it has in the case of Zambia, cancel out the exchange benefits of exporting some of the product (179).

Although many developing countries now grow tobacco, many also import both Western tobacco for blending and Western cigarettes. These purchases use valuable foreign exchange that might otherwise be spent for development. Developing areas that imported more than 1,000 metric tons of tobacco or tobacco products in 1977 were Algeria, Ecuador, Egypt, Ghana, Hong Kong, Ivory Coast, Jamaica, Malaysia, Morocco, Senegal, Singapore, Tunisia, Uruguay, and Zaire (247).

Overall, despite the payments to small farmers and distributors and the substantial revenues to commercial firms and governments, tobacco becomes a net cost rather than a benefit to society whenever a large proportion of the population smokes enough to suffer the impact of tobacco-induced disease. Yet

Table 15. Estimated Economic Costs of Tobacco Use in the United States, 1976

	Estimated %age of cases involving tobacco use	Costs (in millions of $US)				
		Health Care Direct Costs	Indirect Costs (Lost Earnings)		Property Costs	Total
			Morbidity	Mortality		
Neoplasia	20.0	1,077.4	230.1	3,372.7	—	4,680.2
Circulatory System Disease	25.0	3,797.9	2,141.5	7,582.4	—	13,521.8
Respiratory System Disease	40.0	3,300.6	3,785.2	1,833.6	—	8,919.4
Fires	1.1	48.1	35.0	159.3	175.9	418.3
Total		8,224.0	6,191.8	12,948.0	175.9	27,539.7

Source: Adapted from Luce and Schweitzer (147) the financial pressures facing governments have impeded the development of health-oriented tobacco policies. In the long run, however, as the World Health Organization (WHO) Technical Report *Smoking and Its Effects on Health* pointed out in 1974, "economic cost-benefit studies are not conclusive, since the true gain from reducing smoking will be in human terms and in the reduction of ill-health and of premature death, rather than merely in monetary terms" (277).

Policies to Control Tobacco Use

As medical knowledge and public awareness of the hazards of smoking advanced, the English-speaking and Scandinavian countries, where levels of smoking were high, became the first to consider government policies to discourage tobacco use. But policy change has been slow. As early as 1957 the British Medical Research Council released a comprehensive review of research findings and concluded that cigarette smoking was the major cause of increasing mortality from lung cancer (160). In 1962 the Royal College of Physicians of London published a similar report (213).

In the United States the 1964 Report of the Surgeon General's Advisory Committee marked a watershed in public policy (258). Upon the unanimous finding of a panel of distinguished experts that "cigarette smoking is a health hazard of sufficient importance in the United States to warrant remedial action," the US Public Health Service gradually took on leadership in combating smoking. Similarly in both Norway and Finland official concern over the dangers of smoking was first expressed in the mid-1960s, yet major policy initiatives and legislation were delayed until the mid-1970s.

> **"Cigarettes are not a prime necessity. We have a severe shortage of food. We have to pay large sums for the import of food. Why then should we divert an increasing quantity of land, fertilizer and water for tobacco cultivation? . . . What are our priorities? Do we want an emphasis on a commodity which ultimately ends up in smoke? Why should we pay British-American Tobacco for increasing the susceptibility of our people to disease, especially cancer?"**
>
> **Father Tissa Balasuriya**
> **Center for Society and Religion**
> **Sri Lanka** (179)

WHO PANEL CONVENED; REPORT DUE BY JUNE 1979

Continuing its concern over the effects of smoking as an international health problem, the World Health Organization (WHO) convened an Expert Committee on Smoking Control October 23-28, 1978. The Expert Committee's report will be released in mid-1979, it is anticipated, in time for the Fourth World Conference on Smoking and Health, to be held in Stockholm in June 1979, under the auspices of the Swedish government.

Members of the WHO Expert Committee on Smoking Control are:

Professor O.O. Akinkugbe, Vice Chancellor, Ahmadu Bello University, Zaria, Nigeria
Dr. K. Bjartveit, Director, National Council on Smoking and Health, Oslo, Norway (Rapporteur)
Dr. H. Coudreau, Director-General, Comité National contre la Tuberculose et les Maladies Respiratoires, Paris, France
Dr. E. Crofton, Medical Director, Scottish Committee, Action on Smoking and Health, Edinburgh, Scotland
Sir George Godber, Cambridge, England (Chairman)
Dr. N. Gray, Director, Anti-Cancer Council of Victoria, East Melbourne, Australia (Rapporteur)
Dr. D. Horn, c/o Office on Smoking and Health, Rockville, Maryland, USA
Dr. D. Loransky, Director, Central Institute for Scientific Research in Health Education, Ministry of Health of the USSR, Moscow, USSR
Dr. L. Ramström, Director-General, National Smoking and Health Association, Stockholm, Sweden
Dr. J. Sulianti Saroso, Adviser to the Minister of Health, Jakarta, Indonesia

Secretariat:
Dr. R. Masironi, Scientist, Cardiovascular Diseases, WHO, Geneva, Switzerland (Secretary)
S. Fluss, Health Legislation, WHO, Geneva, Switzerland

In 1974 the World Health Organization convened an Expert Committee on Smoking and Its Effects on Health and issued a report (277). The Expert Committee made extensive recommendations with respect to actions that national governments and international agencies could take. A new report will be issued in 1979 (see box, col. 1). The objectives for government programs recommended in the 1974 WHO report are:

1. As few young people as possible should start smoking and those doing so should start as late as possible.
2. As many smokers as possible should be encouraged and assisted to stop smoking.
3. Those who are unable to stop smoking should try to reduce their exposure to such harmful substances in smoke as tar, nicotine, and carbon monoxide (276).

There are a number of possible components in a comprehensive, health-oriented tobacco-control policy, but no country has yet adopted the full range of actions that have been proposed. These include.

- expanding research
- undertaking public education campaigns
- raising taxes, especially on high tar and nicotine products
- establishing government standards for production
- reducing export subsidies
- eliminating agricultural extension and government support services
- requiring health warnings on packages of tobacco products and in advertisements
- labelling packages to indicate levels of harmful components
- limiting or prohibiting advertising
- limiting sales, e.g., to minors or in certain locations
- prohibiting smoking in public areas or work places
- establishing differential life insurance rates for smokers

Most of the developed countries have adopted some restrictions along these lines. Most of the developing countries have not, with the exception of some of the major importing countries, which, not surprisingly, have been among the first to recognize the costs of tobacco use (see Table 16).

Given the economic influence of the industry, governments have found it easiest to expand research. In fact, tobacco companies have often contributed to research projects and are themselves financing extensive research to find safer tobacco products. The introduction of a synthetic tobacco cigarette in the UK was not successful, however, and has discouraged research into tobacco substitutes (246). Research continues to develop tobacco products with less tar and nicotine content even as public health officials debate the ethics of helping to develop a product that is at best only slightly less harmful.

Raising taxes or prices has proved to be another relatively uncontroversial way to discourage smoking. In recent years taxes have been increased in developed and developing countries ranging from Switzerland to Venezuela. In Venezuela, part of the tax is being used by the National Tobacco Fund for development in the rural tobacco regions (154). In Britain a graduated tax was imposed in 1978, with the highest rates on high tar cigarettes (244). The impact of price increases on sales is limited, since the demand for tobacco products is relatively inelastic. Nevertheless, in Belgium, Luxembourg, the Netherlands, West Germany, India, and Italy recent price boosts have reduced sales somewhat (246). In the Philippines declines in purchasing power have served to cut consumption (246). Although one analysis of per capita levels of cigarette consumption in 47 countries found that total per capita spending, not prices, was the strongest determinant of cigarette consumption, higher prices for cigarettes do exert some negative pressure on consumption (194).

With respect to tobacco advertising, a 1974 survey of tobacco regulatory policies found that, whereas 20 of 25 developed countries imposed some restrictions on tobacco promotion, only 13 of 49 developing countries did (5). Most of the larger developed countries have banned radio and television advertising of cigarettes and usually of other tobacco products as well. Press advertising is also banned in Iceland, Italy, Poland, Sweden, the Soviet Union, Norway, and Finland, among others (225).

A much smaller number of developing countries have instituted such laws. Peru, for example, prohibits radio and television advertising before 9 p.m. A near-complete media ban on advertising was instituted by Singapore in 1970, prohibiting all forms of promotion of tobacco, written or oral, and exempting only foreign periodicals (277). Burma, Iraq, Korea, Saudi Arabia, Turkey, and Zambia all impose some limits on tobacco advertising, mainly on radio and television (5). Since 1974, Colombia, Egypt, India, and Mexico also have imposed some restrictions on tobacco advertising (225).

Health warnings on cigarette or other tobacco product packages are becoming more common. In the United States, for example, cigarette packages carry the statement: "Warning: The Surgeon General Has Determined That Cigarette Smoking Is Dangerous to Your Health." Recently the Secretary of Health, Education, and Welfare has embarked on a more vig-

Table 16. National Policies to Control Promotion and Use of Tobacco, 1978

Developed	Restrictions on Advertising	Health Warning On Packages	Restrictions On Sales To Minors	Restrictions On Smoking	Anti-Smoking Education
Australia	✓	✓			
Austria	✓				
Belgium	✓	✓		✓	
Bulgaria	✓		✓	✓	✓
Canada	✓	✓	✓		
Czechoslovakia	✓				
Denmark	✓				
Finland	✓	✓	✓	✓	✓
France	✓	✓			✓
Germany, F.R.	✓				
Iceland	✓	✓			
Ireland	✓	✓			
Italy	✓			✓	✓
Japan	✓	✓	✓	✓	
Malta	✓				
Netherlands	✓				
New Zealand	[a]	[a]	✓		
Norway	✓	✓	✓		
Poland	✓			✓	
Soviet Union	✓		✓	✓	✓
Sweden	✓	✓			
Switzerland	✓	✓	✓		
United Kingdom	✓	✓	✓		
United States	✓	✓	✓		✓
by state			45	30[c]	34[d]
Total	23	13	10	7	6

Developing	Restrictions On Advertising	Health Warning On Packages	Restrictions On Sales To Minors	Restrictions On Smoking	Anti-Smoking Education
Burma	✓				
Colombia	✓	✓			
Costa Rica		✓			
Ecuador		✓			
Egypt	✓				
Greece					✓
India	[b]	✓			
Iraq	✓				
Korea, South	✓				
Malaysia		✓			
Mexico	✓	✓			
Morocco				✓	
Mozambique	✓				
Panama	[b]	✓			
Peru	[b]	✓			
Romania				✓	
Saudi Arabia	✓				
Singapore	✓			✓	
Spain	✓				
Thailand			✓		
Turkey	✓				
Venezuela		✓			
Zambia	✓				
Total	12	9	1	3	1

[a] Restrictions on a voluntary basis

[b] Warnings required in advertising

[c] Of these, 22 are considered relatively stringent or extensive.

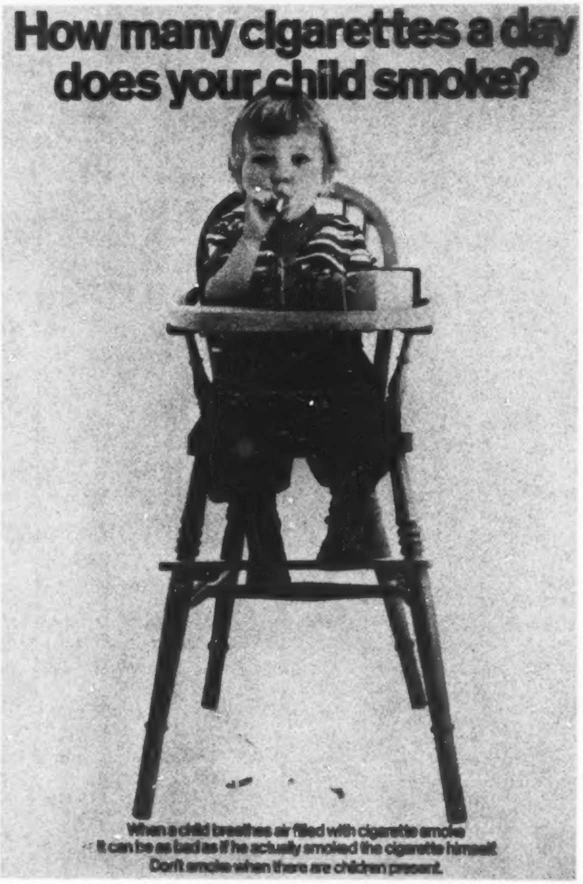
[d] Mandatory drug, alcohol, and tobacco education programs

Source: US Office on Smoking and Health (225), World Tobacco (5) orous anti-smoking campaign despite continuing opposition from tobacco growers and producers.

To go beyond that warning, the Massachusetts Department of Public Health has recently recommended to the federal government that the warning label on cigarette packages be revised to read: "Cigarette smoking is hazardous to your health and can cause fatal cancer, heart disease and lung disease. Smoking during pregnancy increases the risk of complications, and the risk of death of the unborn baby or newborn infant" (76).

Package warnings are also required in Australia, Belgium, Canada, Finland, France, Iceland, Ireland, Japan, Norway, Sweden, Switzerland, New Zealand, and the United Kingdom. Among the developing countries, nine — Colombia, Costa Rica, Ecuador, India, Malaysia, Mexico, Panama, Peru, and Venezuela — now also require warnings (225).

Although the People's Republic of China has captured world attention with massive public health campaigns against venereal disease, malaria, and schistosomiasis, only recently have voices there been raised against smoking. Both Mao Tse-tung and Chou En-lai were chain smokers. Their example, plus the taxes collected on each package of cigarettes, may have delayed government action against smoking. But there are signs that this is changing. In late 1978 the *Kwangming Daily*, a Peking newspaper for intellectuals and professionals, carried an article by two doctors warning of the links between cigarettes and various cancers, respiratory disease, and circulatory system diseases (154). This contrasts with earlier reports that cigarette smoking was "not considered a major factor in the causation of bronchogenic cancer" even though smoking has increased rapidly in the past 30 years and lung cancer incidence in Shanghai, for example, has doubled in the last decade (124). Concern over the growing number of young people who smoke as well as the need to put more land into food production may lead to more health-oriented tobacco policies (154).


How many cigarettes a day does your child smoke?
When a child breathes air filled with cigarette smoke
it can be as bad as if he actually smoked the cigarette himself.
Don't smoke when there are children present.

Infants exposed to tobacco smoke have more respiratory tract ailments. (Health Education Council, UK)

Educational Campaigns

Anti-smoking campaigns in a number of developed countries seem to be playing a more important role both in encouraging smokers to quit and in discouraging others from taking up the habit. In the US, Japan, France, and the United Kingdom, for example, these efforts have halted any increase in consumption and are contributing to slight declines (246). Although there has not been a single, coordinated effort in the United States, various public and private organizations have been actively encouraging people to quit or reduce smoking for nearly two decades. Examining actual and predicted per capita cigarette consumption, K.E. Warner found an immediate but short-lived decrease of 4 to 5 percent in annual per capita consumption following the Surgeon General's report in 1964. By 1975, he found, a cumulative decline of 22 percent in smoking as a result of ongoing anti-smoking publicity and public policies had taken place (267).

Educational efforts may also have had tangible effects in France. The French Ministry of Health reported in 1977 that a year-long educational campaign had produced a 15 percent decline in the number of cigarettes consumed by adults and an even greater decline among the young. The number of smokers was reduced by 3 percent (2).

The United States experience suggests an indirect relationship between public education and public policy: Warner concludes that the tax increases, which helped to discourage usage, would not have been politically possible without extensive anti-smoking publicity (267). Conversely, in Finland, public debate over proposed legislation had a strong educational effect, making the public aware of the health impact of smoking (137). Where polls have been taken, 80 to 90 percent of the public approve bans on tobacco promotion (29, 137).

Regulations to restrict sales to minors (and even to limit vending machine sales, as in Finland) have also been well accepted. Indeed, some of these regulations date back to the last century (29). Even today few tobacco companies argue for the right to stimulate sales among minors even though advertising and promotion is often clearly aimed in that direction.

Beyond indirect measures affecting taxation, advertising, public education, and restrictions on sales to minors, pressure is mounting to adopt more stringent policies banning smoking in public areas and places of employment. The comprehensive 1975 Finnish legislation, for example, includes such a ban (137). In the United States, some 30 states and cities such as New York and Washington, D.C., limit smoking in elevators, public transit, food stores, restaurants, or other enclosed public areas. Six states ban smoking in schools (225). In California, however, a referendum to place even more stringent limits on smoking indoors was defeated in 1978, following an extensive public relations campaign by tobacco interests that played on popular dislike of government regulation. A number of private or public health organizations, such as the German Medical Society and Brazil's Federal Council of Medicine, prohibit

¿Te crees muy gallo porque fumas?
don't be a bear for punishment!
even the longest filter doesn't help much!
baa...d news!
don't you get hooked!

The US Department of Health, Education, and Welfare has embarked on a national campaign to discourage young children from taking up smoking.
(Office of Smoking and Health, USDHEW)

smoking during their meetings, and smoking is not permitted in official meetings of WHO (277). With new attention to the possible adverse affects of "passive smoking" and with the number of ex-smokers growing, the developed countries will probably see more of such restrictions.

So far the most controversial policy area, still untouched in the United States and ignored elsewhere, involves tobacco production, agricultural support services, and exports. Governments continue to supervise or regulate production for sales and price support rather than safety; they continue to provide agricultural extension services to boost productivity; and, like the United States, they welcome and even subsidize export sales while acting to reduce domestic consumption (179).

There has been little substantial change since 1974 despite growing evidence that the long term health costs of tobacco use will outweigh the short term financial returns. As in the developed countries, it should be the responsibility of health professionals, above all, to recognize and publicize the dangers in developing nations.

Health and Family Planning Professionals

Physicians, including obstetricians and gynecologists, can be a valuable source of information on smoking (47). In the United States over 90 percent of practicing physicians believe that they are responsible for setting a good example by not smoking. The drop in the percentage of US doctors who smoke, from 29.6 percent in 1967 to 21.0 percent in 1975, is testimony to that belief (249). In developing countries, however, medical schools often show a higher proportion of smokers than any other higher educational curriculum. For example, in Uganda a 1969 survey found that over 50 percent of third-year medical students smoked (14), and smoking rates among Malaysian medical students reported in 1975 showed a jump from 15.5 percent of the first-year class to an average of 28.8 percent for the third-year and beyond (195). Among male and female medical students in Lagos, Nigeria, smoking rates are 72 and 22 percent, respectively (68). Physicians in developing countries may need first to inform and educate themselves to the dangers of smoking before they can effectively advise their patients.

In its 1974 report WHO suggested that special attention should be given to:

> ***Health workers***, who should recognize the importance of their role in discouraging smoking and be prepared to assist people who encounter difficulty in stopping smoking. They should:
> (i) themselves set an example by not smoking, especially in the presence of young people and patients, and encourage their patients and families to stop smoking;
> (ii) discourage young people from starting to smoke;

(iii) draw the attention of smokers with impaired lung function, those known to be at risk of ischaemic heart disease, and pregnant women, to the special dangers of smoking for them;
(iv) urge that action against smoking should form part of all medical and health care programmes, and actively participate in health education activities, expressing support for policies and programmes for the control and prevention of smoking (277).

Family planning programs, in their role as promoters of reproductive health, are a particularly appropriate vehicle for education on the danger of tobacco to childbearing. Mothers' classes offer an excellent opportunity to change pregnant women's smoking habits and also to discover which educational approaches are the most effective (77). So far, however, there has been little study of smoking cessation programs for prospective mothers. An intensive US program involving 11 pregnant women achieved a reduction in average number of cigarettes smoked for 9 of the participants (48), but research in England suggests that those most likely to stop smoking are those who smoked less at the beginning of pregnancy (58). This should be expected; it indicates not so much a failure of anti-smoking programs as it does the strength of the tobacco habit, which is properly described as "drug dependence" (214).

Despite an increasing awareness among specialists of the dangers of maternal smoking to the fetus and neonate, this information has yet to reach many women in their childbearing years even in the developed countries. A government-sponsored survey conducted in the United States in 1975 found that only 60 percent of women questioned believed at the time of their last pregnancy that smoking was harmful to the fetus (254). The percentage of women who are aware of tobacco's effects on pregnancy is probably much lower in countries having no anti-smoking campaigns.

The Massachusetts Department of Public Health has recently outlined steps that those who provide obstetrical care should take to dissuade pregnant women from smoking. These recommendations could be adapted for use in developing countries (see box).

Massachusetts Department of Public Health Recommendations to Health Care Specialists Regarding Smoking Among Pregnant Women

1. In the initial prenatal visit, the health care specialist should include tobacco in the usual list of drugs that are known to adversely affect the outcome of pregnancy and are thus to be avoided. Mention may be made that during pregnancy, when use of all pharmacologic agents is to be kept to a minimum, cigarette smoke, which contains over 1,000 chemical agents, is of special concern.
2. Pregnant women should be told that evidence to date suggests that they are at especially high risk for detrimental effects of smoking on the pregnancy if they have had a history of previous perinatal loss, bleeding or placental complications, if they are anemic or if they are in the older age group.
3. Any woman with bleeding at any time during pregnancy should be questioned closely on whether or not she smokes, and the dangers of smoking to the fetus re-emphasized.
4. Health facilities should not permit smoking in any areas where staff and patients come in contact. Prominent "No Smoking" signs should be displayed in all patient areas and the prohibition enforced.

Source: Fielding & Russo (76)

In the last century health improvements in the developed countries were achieved largely by means of reforms in sanitation implemented before mechanisms of infection were fully understood. By the same token, anti-tobacco measures should not wait for the results of further research on tobacco and health, even though such efforts are worthwhile and needed (277). There is no doubt that tobacco impairs adult health and healthy childbearing. Further inquiries into the epidemiology and biological mechanisms of tobacco's effects will be valuable, but the need for measures to reduce the use of tobacco is crucial and immediate.

BIBLIOGRAPHY

1. ANONYMOUS. Cigarette smoking and spontaneous abortion. British Medical Journal 1(6108): 259. February 4, 1978.

2. ANONYMOUS. French gains in attack on smoking. World Health, May 1977. p. 30-31.

3. ANONYMOUS. Is tobacco teratogenic? Medical Journal of Australia 1(18): 896. April 29, 1977.

4. ANONYMOUS. News views and trends. World Tobacco 54: 47. October 1976.

5. ANONYMOUS. Publicity bans and health warnings: a 74-nation resume of oppression. World Tobacco, No. 45, June-July 1974. p. 44-45.

6. ANONYMOUS. Smoking and disease: the evidence reviewed. WHO Chronicle 29(10): 402-408. October 1975.

7. ANONYMOUS. Smoking during pregnancy. American Lung Association Bulletin 63(8): 9. October 1977.

8. ANONYMOUS. World action on smoking. [Editorial] British Medical Journal 4(5779): 65-66. October 9, 1971.

9. AMERICAN ACADEMY OF PEDIATRICS. COMMITTEE ON ENVIRONMENT HAZARDS. Effects of cigarette-smoking on the fetus and the child. Pediatrics 57(3): 411-413. March 1976.

10. AMERICAN CANCER SOCIETY. All of the key facts: the dangers of smoking, the benefits of quitting. New York, ACS, 1972. 48 p.

11. ANDERSON, H.R. Smoking habits and their relationship to chronic lung disease in a tropical environment in Papua New Guinea. Bulletin de Physio-Pathologie Respiratoire 10(5): 619-633. September-October 1974.

12. ANDREWS, J. and McGARRY, J.M. A community study of smoking in pregnancy. Journal of Obstetrics and Gynaecology of the British Commonwealth 79(12): 1057-1073. December 1972.

13. ARKIN, A. and WAGNER, D.H. Primary carcinoma of the lung: study of one hundred and thirty-five cases in four years. Journal of the American Medical Association 106(8): 587-591. February 22, 1936.

14. ARYA, O.P. and BENNET, F.J. Smoking amongst university students in Uganda: an analysis of prevalence and attitudes. East African Medical Journal 47(1): 18-28. January 1970.

15. ASHCROFT, M., BEADNELL, G., BELL, R., and MILLER, G.J. Characteristics relevant to cardiovascular disease among adults of African and Indian origin in Guyana. Bulletin of the World Health Organization 42: 205-223. 1970.

16. ASMUSSEN, I. Arterial changes in infants of smoking mothers. Postgraduate Medical Journal 54(629): 200-205. March 1978.

17. ASMUSSEN, I. Ultrastructure of human umbilical veins: observations of veins from newborn children of smoking and nonsmoking mothers. Acta Obstetricia et Gynecologica Scandinavica 57(3): 253-255. 1978.

18. BAILEY, R.R. The effect of maternal smoking on the infant birth weight. New Zealand Medical Journal 71(456): 293-294. May 1970.

19. BAIN, C., HENNEKENS, C.H., ROSNER, B., SPEIZER, F.E., and JESSE, M.J. Cigarette consumption and deaths from coronary heart-disease. Lancet 1(8073): 1087-1088. May 20, 1978.

20. BANERJEE, R.N. Prevalence of habit-forming drugs and smoking among the college students: a survey. Indian Medical Journal 57(8): 193-196. August 1963.

21. BARD, S.M. and PEACOCK, J.B. Smoking and drinking habits of students at the University of Hong Kong: a longitudinal study. Public Health 90(5): 219-225. July 1976.

22. BAYLET, R., FRAMENT, V., DIOP, S., BELINGA, N., and DE MEDEIROS, D. Enquêtes sur l'utilisation du tabac dans les centres coutumiers et en milieu urbanisé au Sénégal. [A study on the use of tobacco in native areas and urban environments in Senegal] [FR] Bulletin de la Societe Medical d'Afrique Noire de Langue Francaise 19(1): 36-40. 1974.

23. BEGUM, F. and FORTNEY, J. Data from the International Fertility Research Program. January 19, 1979. 1 p. (Unpublished)

24. BENSON, R.C. Premature labor and the small-for-dates infant. In: Danforth, D.N., ed. Obstetrics and gynecology. 3rd ed. Hagerstown, Maryland, Harper and Row, 1977. p. 618-627.

25. BERGMAN, A.B. and WIESNER, B.A. Relationship of passive cigarette-smoking to sudden infant death syndrome. Pediatric: 58(5): 665-668. November 1976.

26. BERNARD, R.P. Accounting of the reproductive process as derived from maternity care monitoring. (8th International Scientific Meeting of the International Epidemiological Association, San Juan, Puerto Rico, September 17-23, 1977) Research Triangle Park, North Carolina, International Fertility Research Program, 1977. 73 p.

27. BEST, E.W.R. A Canadian study of smoking and health. Ottawa, Canada, Department of National Health and Welfare, 1966. 137 p.

28. BHONSLE, R.B., MURTI, P.R., GUPTA, P.C., and MEHTA, F.S. Reverse dhumti smoking in Goa: an epidemiologic study of 5449 villagers for oral precancerous lesions. Indian Journal of Cancer 13(4): 301-305. December 1976.

29. BJARTVEIT, K. The Norwegian Tobacco Act (Introduction). Scandinavian Journal of Respiratory Diseases (Suppl. 102): 142-146. 1978.

30. BLAKE, C.A. and SAWYER, C.H. Nicotine blocks the suckling-induced rise in circulating prolactin in lactating rats. Science 177(49): 619-621. August 18, 1972.

31. BOLDMAN, R. and REED, D.M. Worldwide variations in low birth weight. In: Reed, D.M. and Stanley, F.J. The epidemiology of prematurity. Baltimore, Maryland, Urban and Schwarzenberg, 1977. p. 39-51.

32. BOMPOINT, J. Tabagisme et cancer du larnyx au Maroc: étude statistique sur 500 cas. [Nicotinism and larnyx cancer in Morocco: statistical study of 500 cases] [FR] Revue de Laryngologie Rhinologie 97(11-12): 729-732. 1976.

33. BRADT, P.T. and HARRENKOHL, R.C. DDT in human milk: what determines the levels? Science of the Total Environment 6: 161-163. 1976.

34. BREEN, J.L., DEMARSICO, R., and GREGORI, C.A. Smoking and pregnancy. Journal of the Medical Society of New Jersey 75(2): 124-135. February 1978.

35. BRIGGS, M.H. Cigarette smoking and infertility in men. Medical Journal of Australia 1(12): 616-617. March 24, 1973.

36. BUELL, P., DUNN, J.E., Jr., and BRESLOW, L. Cancer of the lung and Los-Angeles-type air pollution: prospective study. Cancer 20(12): 2139-2147. December 1967.

37. BUNCHER, C.R. Cigarette smoking and duration of pregnancy. American Journal of Obstetrics and Gynecology 103(7): 942-946. April 1, 1969.

38. BUTLER, N.R. and ALBERMAN, E.D. Perinatal problems: the Second Report of the 1958 British Perinatal Mortality Survey under the auspices of The National Birthday Trust Fund. Edinburgh, Scotland, Livingstone, 1969. 395 p.

39. BUTLER, N.R. and GOLDSTEIN, H. Smoking in pregnancy and subsequent child development. British Medical Journal 4(5892): 573-575. December 8, 1973.

40. BUTLER, N.R., GOLDSTEIN, H., and ROSS, E.M. Cigarette smoking in pregnancy: its influence on birth weight and perinatal mortality. British Medical Journal 2(5806): 127-130. April 15, 1972.

41. COLE, P.V., HAWKINS, L.H., and ROBERTS, D. Smoking during pregnancy and its effects on the fetus. Journal of Obstetrics and Gynaecology of the British Commonwealth 79(8): 782-787. September 1972.

42. COLLEY, J.R., HOLLAND, W.W., and CORKHILL, R.T. Influence of passive smoking and parental phlegm on pneumonia and bronchitis in early childhood. Lancet 2(7888): 1031-1034. November 2, 1974.

43. COMSTOCK, G.W., SHAH, F.K., MEYER, M.B., and ABBEY, H. Low birth weight and neonatal mortality rate related to maternal smoking and socioeconomic status. American Journal of Obstetrics and Gynecology 111(1): 53-59. September 1, 1971.

44. COOK, J.D., ALVARDO, A., GUTNISKY, A., JAMRA, M., LABARDINI, J., LAYRISSE, M., LINARES, J., LORIA, A., MASPES, V., RESTREPO, A., REYNAFARJE, C., SANCHEZ-MEDAL, L., VELEX, H., and VITERI, F. Nutritional deficiency and anemia in Latin America: a collaborative study. Blood 38(5): 591-603. November 1971.

45. COOPER, K.H., GREY, G.O., and BOTTENBERG, R.A. Effects of cigarette smoking on endurance performance. Journal of the American Medical Association 203(3): 123-126. January 15, 1968.

46. COPE, I., LANCASTER, P., and STEVENS, L. Smoking in pregnancy. Medical Journal of Australia 1(14): 673-677. April 17, 1973.

47. DANAHER, B.G. Obstetric and gynecology intervention in helping smokers quit. Paper presented at the International Conference on Smoking Cessation, New York, June 22, 1978. 20 p.

48. DANAHER, B.G., SHISSLAK, C.M., THOMPSON, C.B., and FORD, J.D. A smoking cessation program for pregnant women: an exploratory study. American Journal of Public Health 68(9): 896-898. September 1978.

49. DANIELL, H.W. Osteoporosis of the slender smoker: vertebral compression fractures and loss of metacarpal cortex in relation to postmenopausal cigarette smoking and lack of obesity. Archives of Internal Medicine 136(3): 298-304. March 1976.

50. DANIELL, H.W. Smoking, obesity, and the menopause. [Letter] Lancet 2(8085): 373. August 12, 1978.

51. DATEY, K.K. and DALVI, C.P. Tobacco and health. Indian Journal of Chest Diseases 14(3): 158-167. July 1972.

52. DAVIE, R., BUTLER, N., and GOLDSTEIN, H. From birth to seven: a report of the National Child Development Study. London, Longman's, 1972. 198 p.

53. DAVIES, D.P., GRAY, O.P., ELLWOOD, P.C., and ABERNATHY, M. Cigarette smoking in pregnancy: associations with maternal weight gain and fetal growth. Lancet 1(7956): 385-387. February 21, 1976.

54. DIETZ, G.J. Venezuela: tobacco report. Report submitted to the United States Department of Agriculture. Foreign Agricultural Service, October 27, 1978. 2 p. (Unpublished)

55. DOLDER, M.A. and OLIVER, M.F. Myocardial infarction in young men: study of risk factors in nine countries. British Heart Journal 37(5): 493-503. May 1975.

56. DOLL, R. and HILL, A.B. Mortality in relation to smoking: ten years' observations of British doctors. British Medical Journal 1(5395): 1399-1410. May 30, 1964.

57. DOLL, R. and HILL, A.B. Mortality in relation to smoking: ten years' observations of British doctors. [Conclusion] British Medical Journal 1(5396): 1460-1467. June 6, 1964.

58. DONOVAN, J.W. A randomized control trial of anti-smoking advice and pregnancy. British Journal of Preventive and Social Medicine 31(1): 6-12. March 1977.

59. DOUGLAS, J.W.B. "Premature" children at primary schools. British Medical Journal 1(5178): 1008-1013. April 2, 1960.

60. DOW, T.G.B., ROONEY, P.J., and SPENCE, M. Does anaemia increase the risks to the fetus caused by smoking in pregnancy? British Medical Journal 4(5991): 253-254. November 1, 1975.

61. D'SOUZA, S.W., BLACK, P.M., WILLIAMS, N., and JENNISON, R.F. Effect of smoking during pregnancy upon the haematological values of cord blood. British Journal of Obstetrics and Gynaecology 85(7): 495-499. July 1978.

62. DUFFUS, G.M. and MacGILLIVRAY, I. The incidence of pre-eclamptic toxaemia in smokers and nonsmokers. Lancet 1(7550): 994-995. May 11, 1968.

63. DUNN, H.G., McBURNEY, A.K., INGRAM, S., and HUNTER, C.M. Maternal cigarette smoking during pregnancy and the child's subsequent development: 1. Physical growth to the age of 6 1/2 years. Canadian Journal of Public Health 67(6): 499-505. November-December 1976.

64. DUNN, H.G., McBURNEY, A.K., INGRAM, S., and HUNTER, C.M. Maternal cigarette smoking during pregnancy and the child's subsequent development: 2. Neurological and intellectual maturation to the age of 6½ years. Canadian Journal of Public Health 68(1): 43-50. January-February 1977.

65. ECKHOLM, E. Cutting tobacco's toll. Washington, D.C., Worldwatch Institute, March 1978. (Worldwatch Paper No. 18) 40 p.

66. ECKHOLM, E. The other energy crisis: firewood. Washington, D.C., Worldwatch Institute, 1975. (Worldwatch Paper No. 1) 22 p.

67. ELEGBELEYE, O.O. Bronchial carcinoma in Nigerians: a report of six cases. Journal of Tropical Medicine and Hygiene 78(3): 59-62. March 1975.

68. ELEGBELEYE, O.O. and FEMI-PEARSE, D. Incidence and variables contributing to onset of cigarette smoking among secondary school children and medical students in Lagos, Nigeria. British Journal of Preventive and Social Medicine 30(1): 66-70. March 1976.

69. EWING, L. [Testosterone levels, libido and spermatogenesis] Personal communication, November 21, 1978. 1 p.

70. EYSENCK, H.J. Smoking, health and personality. London, Weidenfeld and Nicolson, 1965. 166 p.

71. EYSENCK, H.J. Smoking, personality, and psychosomatic disorders. Journal of Psychosomatic Research 7: 107-130. October 1963.

72. EYSENCK, H.J., TARRANT, M., WOOLF, M., and ENGLAND, L. Smoking and personality. British Medical Journal 1(5184): 1456-1460. May 1960.

73. FABIA, J. Cigarettes pendant la grossesse, poids de naissance et mortalité perinatale. [Cigarettes during pregnancy, birth weight and perinatal mortality] [FR] Canadian Medical Association Journal 109: 1104-1109. December 1, 1973.

74. FEDRICK, J., ALBERMAN, E.D., and GOLDSTEIN, H. Possible teratogenic effect of cigarette smoking. Nature 231: 529-530. June 25, 1971.

75. FEDRICK, J. and ANDERSON, A.B.M. Factors associated with spontaneous pre-term birth. British Journal of Obstetrics and Gynaecology 83(5): 342-350. May 1976.

76. FIELDING, J.E. and RUSSO, P.K. Smoking and pregnancy. New England Journal of Medicine 298(6): 337-339. February 9, 1978.

77. FIELDING, J.E. and YANKAUER, A. The pregnant smoker. [Editorial] American Journal of Public Health 68(9): 835-836. September 1978.

78. FLETCHER, C.M. and HORN, D. Smoking and health. WHO Chronicle 24(8): 345-370. August 1970.

79. FORTNEY, J. [International Fertility Research Program] [Maternity Care Monitoring System data on smoking and pregnancy] Personal communication, January 12, 1979. 3 p.

80. FRAZIER, T.M., DAVIS, G.H., GOLDSTEIN, H., and GOLDBERG, I.D. Cigarette smoking and prematurity: a prospective study. American Journal of Obstetrics and Gynecology 81(5): 988-995. May 1961.

81. FREDERIKSEN, H. and RAVENHOLT, R.T. Thromboembolism, oral contraceptives, and cigarettes. Public Health Reports 85(3): 197-205. March 1970.

82. FRITH, C.D. Smoking behavior and its relation to the smoker's immediate experience. British Journal of Social and Clinical Psychology 10(1): 73-78. February 1971.

83. GARN, S.M., HOFF, K., and McCABE, K.D. Is there nutritional mediation of the "smoking effect" on the fetus? 1978. 4 p. (To be published in American Journal of Clinical Nutrition)

84. GARN, S.M., HOFF, K., and McCABE, K.D. Maternal obesity and the smoking effect. 1978. 8 p. (To be published in American Journal of Obstetrics and Gynecology)

85. GARN, S.M. and SHAW, H.A. Effect of maternal smoking on weight and weight gain between pregnancies. [Letter] American Journal of Clinical Nutrition 31(8): 1302-1303. August 1978.

86. GARN, S.M., SHAW, H.A., and McCABE, K.D. Dose-response effect of maternal smoking. 1978. 6 p. (To be published in Pediatrics)

87. GARN, S.M., SHAW, H.A., and McCABE, K.D. Effect of maternal smoking on hemoglobins and hematocrits of the newborn. [Letter] American Journal of Clinical Nutrition 31(4): 557-558. April 1978.

88. GARN, S.M., SHAW, H.A., and McCABE, K.D. Effects of socioeconomic status and race on weight-defined and gestational prematurity in the United States. In: Reed, D.M. and Stanley, F.J., eds. The epidemiology of prematurity. Baltimore, Maryland, Urban and Schwarzenberg, 1977. p. 127-140.

89. GELFAND, M., GRAHAM, A.J.P., and LIGHTMAN, E. Carcinoma of bronchus and the smoking habit in Rhodesian Africans. British Medical Journal 3(5616): 468-469. August 24, 1968.

90. GENNSER, G., MARSHAL, K., and BRANTMARK, B. Maternal smoking and fetal breathing movements. American Journal of Obstetrics and Gynecology 123(8): 861-867. December 15, 1975.

91. GOLDSMITH, J.R. and LANDAW, S.A. Carbon monoxide and human health. Science 162(3860): 1352-1359. December 20, 1968.

92. GOLDSTEIN, H. Factors influencing the height of seven year old children: results from the National Child Development Study. Human Biology 43(1): 92-111. February 1971.

93. GOLDSTEIN, H. Smoking in pregnancy: some notes on the statistical controversy. British Journal of Preventive and Social Medicine 31(1): 13-17. March 1977.

94. GOPLERUD, C.P. Bleeding in late pregnancy. In: Danforth, D.N., ed. Obstetrics and gynecology. 3rd ed. Hagerstown, Maryland, Harper and Row, 1977. p. 378-390.

95. GOUJARD, J., RUMEAU, C., and SCHWARTZ, D. Smoking during pregnancy, still-birth and abruptio placentae. Biomedicine 23(1): 20-22. February 10, 1975.

96. GRAHN, D. and KRATCHMAN, J. Variation in neonatal death rate and birth weight in the United States and possible relations to environmental radiation, geology and altitude. American Journal of Human Genetics 15: 329-352. 1963.

97. GREENE, G.E. Nonsmokers rights: a public health issue. Journal of the American Medical Association 239(20): 2125-2127. May 19, 1978.

98. HAMMOND, E.C. The scientific background. In: National Interagency Council on Smoking and Health. World Conference on Smoking and Health: a summary of the proceedings, New York, September 11-13, 1967. [American Cancer Society] 1968. p. 41-44.

99. HAMMOND, E.C. Smoking in relation to the death rates of one million men and women. In: Haenszel, W., ed. Epidemiological study of cancer and other chronic diseases. Washington, D.C., U.S. Government Printing Office, January 1966. (National Cancer Institute Monograph 19) p. 127-204.

100. HAMMOND, E.C. and HORN, D. Smoking and death rates: report on forty-four months of follow-up of 187,783 men: 2. Death rates by cause. Journal of the American Medical Association 166(11): 1294-1308. March 15, 1958.

101. HARDY, J.B. and MELLITS, E.D. Does maternal smoking during pregnancy have a long-term effect on the child? Lancet 2(7791): 1332-1336. December 23, 1972.

102. HARLAP, S. and DAVIES, A.M. Infant admissions to hospital and maternal smoking. Lancet 1(7857): 529-532. March 30, 1974.

103. HARLAP, S. and DAVIES, A.M. The pill and births: the Jerusalem study. Final Report. Pt. 1. Text. Jerusalem, Hebrew University, Department of Medical Ecology, January 1978. 90 p.

104. HATCHER, R.A. and CROSBY, H. The elimination of nicotin in the milk. Journal of Pharmacology and Experimental Therapeutics 32(1): 1-6. November 1927.

105. HAWORTH, J.C. and FORD, J.D. Comparison of the effects of maternal undernutrition and exposure to cigarette smoke on the cellular growth of the rat fetus. American Journal of Obstetrics and Gynecology 112(5): 653-656. March 1, 1972.

106. HEATH, C.W. Differences between smokers and non-smokers. Archives of Internal Medicine 101(6): 377-388. June 1958.

107. HELLMAN, L.M., JOHNSON, H.L., TOLLES, W.E., and JONES, E.H. Some factors affecting the fetal heart rate. American Journal of Obstetrics and Gynecology 82(5): 1055-1063. November 1961.

108. HELLMAN, L.M. and PRITCHARD, J.A. Williams obstetrics. 14th ed. New York, Appleton-Century-Crofts, 1971. 1242 p.

109. HICKEY, R.J., CLELLAND, R.C., and BOWERS, E.J. Maternal smoking, birth weight, infant death, and the self-selection problem. American Journal of Obstetrics and Gynecology 131(7): 805-811. August 1, 1978.

110. HILL, A.B. Statistical evidence and inference. In: Hill, A.B. Principles of medical statistics. 9th ed. New York, Oxford University Press, 1971. p. 309-323.

111. HIMMELBERGER, D.U., BROWN, B.W., Jr., and COHEN, E.N. Cigarette smoking during pregnancy and the occurrence of spontaneous abortion and congenital abnormality. American Journal of Epidemiology 108(6): 470-479. December 1978.

112. HIRAYAMA, T. Smoking in relation to the death rates of 265,118 men and women in Japan: a report on five years of follow-up. Paper presented at the 14th American Cancer Society's Science Writers' Seminar, Clearwater Beach, Florida, March 24-29, 1972. 4 p.

113. HOFFMANN, D., SANGHVI, L.D., and WYNDER, E.L. Comparative chemical analysis of Indian bidi and American cigarette smoke. International Journal of Cancer 14(1): 49-53. July 15, 1974.

114. HOLLINGSWORTH, D.R., MOSER, R.J., CARLSON, J.W., and THOMPSON, K.T. Abnormal adolescent primiparous pregnancy: association of race, human chorionic somatomammotropin production, and smoking. American Journal of Obstetrics and Gynecology 125(2): 230-237. September 15, 1976.

115. HORN, D. Smoking and disease: what must be done. WHO Chronicle 31(9): 355-361. September 1977.

116. HORN, D. Why people smoke. World Health, December 1975. p. 28-31.

117. HORN, D., COURTS, F.A., TAYLOR, R.M., and SOLOMON, E.S. Cigarette smoking among high school students. American Journal of Public Health 49(11): 1497-1511. November 1959.

118. JACOBS, M.A., ANDERSON, L.S., CHAMPAGNE, E., KARUSH, N., RICHMAN, S.J., and KNAPP, P.H. Orality, impulsivity and cigarette smoking in men. Journal of Nervous and Mental Disease 143(3): 207-219. March 1966.

119. JAIN, A.K. Mortality risk associated with the use of oral contraceptives. Studies in Family Planning 8(3): 50-54. March 1977.

120. JICK, H., PORTER, J., and MORRISON, A.S. Relation between smoking and age of natural menopause: report from the Boston Collaborative Drug Surveillance Program, Boston University Medical Center. Lancet 1(8026): 1354-1355. June 25, 1977.

121. JOLY, D.J. Cigarette smoking in Latin America: an investigation in 8 cities. Boletin de la Oficina Sanitaria Panamerica 79: 93-111. August 1975.

122. KAHN, H.A. The Dorn study of smoking and mortality among U.S. veterans: report on eight and one-half years of observation. In: Haenszel, W., ed. Epidemiological study of cancer and other chronic diseases. Washington, D.C., U.S. Government Printing Office, January 1966. (National Cancer Institute Monograph 19) p. 1-125.

123. KANNEL, W.B., DAWBER, T.R., COHEN, M.E., and McNAMARA, P.M. Vascular disease of the brain — epidemiologic aspects: the Framingham Study. American Journal of Public Health and the Nation's Health 55(9): 1355-1366. September 1965.

124. KAPLAN, H.S. and TSUCHITANI, P.J., eds. Cancer in China: the report of the American Cancer Delegation visit to the People's Republic of China. Liss, New York, 1978. 236 p.

125. KARPOVITCH, P.V. and HALE, C.J. Tobacco smoking and physical performance. Journal of Applied Physiology 3(10): 616-621. April 1951.

126. KELSEY, J.L., DWYER, T., HOLFORD, T.R., and BRACKEN, M.B. Maternal smoking and congenital malformations: an epidemiological study. Journal of Epidemiology and Community Health 32(2): 102-107. June 1978.

127. KHANOLKAR, V.R. Oral cancer in India. Acta Union International Contra Cancrum 15: 67-77. 1959.

128. KIZER, S. Influencia del habito de fumar sobre el embarazo, parto y recien nacido. [Influence of the smoking habit on pregnancy, delivery and the newborn] [SP] Revista de Obstetricia y Ginecologia de Venezuela 27(4): 595-643. 1967.

129. KLINE, J., STEIN, Z.A., SUSSER, M., and WARBURTON, D. Smoking: a risk factor for spontaneous abortion. New England Journal of Medicine 297(15): 793-796. October 13, 1977.

130. KOLODNY, R. [Testosterone levels and subfecundity] Personal communication, December 15, 1978. 1 p.

131. KRISHNA, K. Tobacco chewing in pregnancy. British Journal of Obstetrics and Gynaecology 85(10): 726-728. October 1978.

132. KUHNERT, P.M., KUHNERT, B.R., and ERHARD, P. Effect of lead on delta-aminolevulinic acid dehydratase activity in maternal and fetal erythrocytes. In: Hemphill, D.D., ed. Trace substances in environmental health-10-1976. A symposium. Columbia, University of Missouri. [1976] p. 41-44.

133. KULLANDER, S. and KÄLLÉN, B. A prospective study of smoking and pregnancy. Acta Obstetricia et Gynecologica Scandinavica 50: 83-94. 1971.

134. LEE, P.N., ed. Statistics of smoking in the United Kingdom. 7th ed. London, Tobacco Research Council, 1976. (Research Paper 1) 120 p.

135. LEE, P.N., ed. Tobacco consumption in various countries. 4th ed. London, Tobacco Research Council, 1975. (Research Paper 6) 86 p.

136. LEHTOVIRTA, P. and FORSS, M. The acute effect of smoking on intervillous blood flow of the placenta. British Journal of Obstetrics and Gynaecology 85(10): 729-731. October 1978.

137. LEPPO, K. Smoking control policy and legislation. [Letter] British Medical Journal 1(6109): 345-347. February 11, 1978.

138. LILIENFELD, A.M. Emotional and other characteristics of cigarette smokers and nonsmokers as related to epidemiological studies of lung cancer and other diseases. Journal of the National Cancer Institute 22(2): 259-282. February 1959.

139. LINDENTHAL, J.J., MYERS, J.K., and PEPPER, M.P. Smoking, psychological status and stress. Social Science and Medicine 6(5): 583-591. October 1972.

140. LINDERHOLM, H. and LUNDSTROM, P. Endogenous carbon monoxide production and blood loss at delivery. Acta Obstetricia et Gynecologica Scandinavica 48: 362-370. 1969.

141. LINQUIST, O. and BENGTSSON, C. Menopausal age in relation to smoking. 1978. 5 p. (To be published in Acta Medica Scandinavica)

142. LONGO, L.D. The biological effects of carbon monoxide on the pregnant woman, fetus, and newborn infant. American Journal of Obstetrics and Gynecology 129(1): 69-103. September 1, 1977.

143. LONGO, L.D. Carbon monoxide: effects on oxygenation of the fetus in utero. Science 194(4264): 523-525. October 1976.

144. LOUGH, J., KINCH, R., SPELLMAN, S., and SHAFFER, E. Oral contraceptives, smoking, and nodular hyperplasia of the liver. Canadian Medical Association Journal 118: 403-404. February 18, 1976.

145. LOWE, C.R. Effect of mothers' smoking habits on birth weight of their children. British Medical Journal 2(5153): 673-676. October 10, 1959.

146. LUBS, M.E. Racial differences in maternal effects on the newborn infant. American Journal of Obstetrics and Gynecology 115(1): 66-76. January 1, 1973.

147. LUCE, B.R. and SCHWEITZER, S.O. Smoking and alcohol abuse: a comparison of their economic consequences. New England Journal of Medicine 298(10): 569-571. March 9, 1978.

148. McGARRY, J. Smoking and leukocyte counts in pregnancy. [Letter] British Medical Journal 1(899): 160. January 26, 1974.

149. McGARRY, J.M. and ANDREWS, J. Smoking in pregnancy and vitamin B12 metabolism. British Medical Journal 2(805): 74-77. April 8, 1972.

150. McKEAN, H.E. Smoking and abortion. [Letter] New England Journal of Medicine 298(2): 113-114. January 12, 1978.

151. MacMAHON, B., ALPERT, M., and SALPER, E.J. Infant weight and parental smoking habits. American Journal of Epidemiology 82(3): 247-261. November 1965.

152. MALIK, S.K. Chronic bronchitis in beedi smokers (preliminary communication). Indian Journal of Chest Diseases 16(2): 94-99. April 1974.

153. MATARAZZO, J.D. and SASLOW, G. Psychological and related characteristics of smokers and non-smokers. Psychological Bulletin 57: 493-513. November 1960.

154. MATHEWS, J. Between puffs, Chinese are told of cigarette perils. Washington Post, September 6, 1978. p. A17.

155. MATTISON, D.R. and THORGEIRSSON, S.S. Smoking and industrial pollution and their effects on menopause and ovarian cancer. Lancet 1(8057): 187-188. January 28, 1978.

156. MAU, G. Smoking and the fetus. [Letter] Lancet 1(7966): 972. May 1, 1976.

157. MAU, G. and NETTER, R. The effects of paternal cigarette smoking on perinatal mortality and the incidence of malformations. Deutsche Medizinische Wochenschrift 99(21): 1113-1118. May 24, 1974.

158. MAZESS, R.B. Neonatal mortality and altitude in Peru. American Journal of Physical Anthropology 23: 209-213. 1965.

159. MEADE, T.W., ARIE, T.H.D., BREWIS, M., BOND, D.J., and MORRIS, J.N. Recent history of ischaemic heart disease and duodenal ulcer in doctors. British Medical Journal 3(5620): 701-704. September 21, 1968.

160. MEDICAL RESEARCH COUNCIL. Tobacco smoking and cancer of the lung. British Medical Journal 1(5034): 1523-1524. June 29, 1957.

161. MEHTA, F.S., PINDBORG, J.J., GUPTA, P.C., and DAFTARY, D.K. Epidemiologic and histologic study of oral cancer and leukoplakia among 50,915 villagers in India. Cancer 24(4): 832-849. October 1969.

162. MEYER, M.B. Effects of maternal smoking and altitude on birth weight and gestation. In: Reed, D.M. and Stanley, F.J., eds. The epidemiology of prematurity. Baltimore, Maryland, Urban and Schwarzenberg, 1977. p. 81-104.

163. MEYER, M.B. The effects of maternal smoking in pregnancy. Core Journals in Pediatrics 2(7): A5-A11. 1978.

164. MEYER, M.B. How does maternal smoking effect birth weight and maternal weight gain? Evidence from the Ontario Perinatal Mortality Study. American Journal of Obstetrics and Gynecology 131(8): 888-893. August 15, 1978.

165. MEYER, M.B. [Perinatal mortality rates for nonsmokers in the Ontario study, by subgroup characteristics] Personal communication, January 2, 1979. 1 p.

166. MEYER, M.B. and COMSTOCK, G.W. Maternal cigarette smoking and perinatal mortality. American Journal of Epidemiology 96(1): 1-10. July 1972.

167. MEYER, M.B., JONAS, B.S., and TONASCIA, J.A. Perinatal events associated with maternal smoking during pregnancy. American Journal of Epidemiology 103(5): 464-476. May 1976.

168. MEYER, M.B. and TONASCIA, J.A. Maternal smoking, pregnancy complications, and perinatal mortality. American Journal of Obstetrics and Gynecology 128(5): 494-502. July 1977.

169. MEYER, M.B., TONASCIA, J.A., and BUCK, C. The interrelationship of maternal smoking and increased perinatal mortality with other risk factors: further analysis of the Ontario Perinatal Mortality Study, 1960-1961. American Journal of Epidemiology 100(6): 443-452. December 1974.

170. MILLER, G.J. Cigarette smoking and irreversible airways obstruction in the West Indies. Thorax 29(5): 495-504. September 1974.

171. MILLER, H.C. and HASSANEIN, K. Maternal smoking and fetal growth of full term infants. Pediatric Research 8(12): 960-963. December 1974.

172. MILLER, H.C., HASSANEIN, K., and HENSLEIGH, P.A. Fetal growth retardation in relation to maternal smoking and weight gain in pregnancy. American Journal of Obstetrics and Gynecology 125(1): 55-60. May 1, 1976.

173. MILLER, R.H. The economic importance of the U.S. tobacco industry. Washington, D.C., U.S. Department of Agriculture, May 1978. 36 p. (Mimeo)

174. MOSER, R.J., HOLLINGSWORTH, D.R., CARLSON, J.W., and LAMOTTE, L. Human chorionic somatomammotropin in normal adolescent primiparous pregnancy: effect of smoking. American Journal of Obstetrics and Cynecology 120(8): 1080-1086. December 15, 1974.

175. MUKHERJEE, S. and MUKHERJEE, S.N. A study of premature births. Indian Journal of Pediatrics 38(285): 389-392. October 1971.

176. MULCAHY, R., MURPHY, J., and MARTIN, F. Placental changes and maternal weight in smoking and nonsmoking mothers. American Journal of Obstetrics and Gynecology 106(5): 703-704. March 1, 1970.

177. MULLER, M. Cigarettes kill the poor and black, too. New Scientist 78(1106): 679-681. June 8, 1978.

178. MULLER, M. Third world smoking. [Editorial] New Scientist 78(1106): 642. June 8, 1978.

179. MULLER, M. Tobacco and the third world: tomorrow's epidemic? London, War on Want, 1978. 111 p.

180. MURPHY, J. and MULCAHY, R. Cigarette smoking and spontaneous abortion. [Letter] British Medical Journal 1(6118): 988. April 15, 1978.

181. MURPHY, J. and MULCAHY, R. The effects of cigarette smoking, maternal age and parity on the outcome of pregnancy. Journal of the Irish Medical Association 67(11): 309-313. June 15, 1974.

182. MURPHY, J.F., MULCAHY, R., and DRUMM, J.E. Smoking and the fetus. [Letter] Lancet 2(8027): 36. July 2, 1977.

183. NAEYE, R.L. Effects of maternal cigarette smoking on the fetus and placenta. British Journal of Obstetrics and Gynaecology 85(10): 732-737. October 1978.

184. NAEYE, R.L. Organ and cellular development in mice growing at simulated high altitude. Laboratory Investigation 15(4): 700-706. 1966.

185. NAEYE, R.L. Relationship of cigarette smoking to congenital anomalies and perinatal death: a prospective study. American Journal of Pathology 90(2): 293. February 1978.

186. NAEYE, R.L. Sudden infant death syndrome: a prospective study. American Journal of Diseases of Children 130(11): 1207-1210. November 1976.

187. NAGUIB, S.M., LUNDIN, F.E., Jr., and DAVIS, H.J. Relation of various epidemiologic factors to cervical cancer as determined by a screening program. Obstetrics and Gynecology 28(4): 451-459. October 1966.

188. NICHOLS, P.L. Minimal brain dysfunction: associations with perinatal complications. Paper presented at Biennial Meeting of the Society for Research in Child Development, New Orleans, Louisiana, 1977. 14 p.

189. NISWANDER K.R. and GORDON, M. The women and their pregnancies. Washington, D.C., U.S. Government Printing Office, 1972. (NIH 73-379) 540 p.

190. NOTANI, P.N., RAO, D.N., SIRSAT, M.V., and SANGHVI, L.D. A study of lung cancer in relation to bidi smoking in different religious communities in Bombay. Indian Journal of Cancer 14(2): 115-121. June 1977.

191. OCHSNER, A. Influence of smoking on sexuality and pregnancy. Medical Aspects of Human Sexuality 5(11): 78-92. November 1971.

192. O'CONNELL, E.J. and LOGAN, G.B. Parental smoking in childhood asthma. Annals of Allergy 32(3): 142-145. March 1974.

193. ORY, H.W. Association between oral contraceptives and myocardial infarction: a review. Journal of the American Medical Association 237(24): 2619-2622. June 13, 1977.

194. PAKKALA, A.L. Living standard influenc [illegible] ree of cigarette smoking. Tobacco Reporter 103(7): 55, 72. Ju [illegible].

195. PATHMANATHAN, I. Smoking habits among medical students in the University of Malaya. Medical Journal of Malaysia 30(2): 88-92. December 1975.

196. PEARL, R. Tobacco smoking and longevity. Science 87(2253): 216-217. March 4, 1938.

197. PERLMAN, H.H., DANNENBERG, A.M., and SOKOLOFF, N. The excretion of nicotine in breast milk and urine from cigaret smoking. Journal of the American Medical Association 120(13): 1003-1009. November 28, 1942.

198. PETERSON, F.J. and KELLEY, D.L. The effect of cigarette smoking upon the acquisition of physical fitness during training as measured by aerobic capacity. Journal of the American College Health Association 17(3): 250-251. February 1969.

199. PETITTI, D.B. and WINGERD, J. Use of oral contraceptives, cigarette smoking, and risk of subarachnoid haemorrhage. Lancet 2(8083): 234-235. July 29, 1978.

200. PETTIGREW, A.R., LOGAN, R.W., and WILLOCKS, J. Smoking in pregnancy: effects on birth weight and on cyanide and thiocyanate levels in mother and baby. British Journal of Obstetrics and Gynaecology 84(1): 31-34. January 1977.

201. PIRANI, B.B.K. Smoking during pregnancy. Obstetrical and Gynecological Survey 33(1): 1-13. January 1978.

202. PRAEGER, K. and MAURER, J.D. [US National Center for Health Statistics] Personal communication, January 19, 1979. 2 p.

203. PRITCHARD, J.A. and MacDONALD, P.C. Williams obstetrics. 15th ed. New York, Appleton-Century-Crofts, 1976. 1003 p.

204. RABOCH, J. and MELLAN, J. Smoking and fertility. British Journal of Sexual Medicine 2(4): 35, 37. August 1975.

205. RAVENHOLT, R.T. Cigarette smoking: magnitude of the hazard. Paper presented at the Annual Meeting of the Epidemic Intelligence Service, Center for Disease Control, Atlanta, Georgia, April 3, 1978, 9 p.

206. RAVENHOLT, R.T. Excess deaths. In: American Cancer Society. All the key facts: the dangers of smoking, the benefits of quitting. New York, ACS, 1972. p. 19.

207. RAVENHOLT, R.T. and APPLEGATE, J.R. Measurement of smoking experience. New England Journal of Medicine 272: 789-790. April 15, 1965.

208. RAVENHOLT, R.T., LEVINSKI, M.J., NELLIST, D.J., and TAKENAGA, M. Effects of smoking upon reproduction. American Journal of Obstetrics and Gynecology 96(2): 267-281. September 15, 1966.

209. RICHER, C. and GUIDICELLI, J.F. Excretion des medicaments dans le lait maternal. [Excretion of drugs in breast milk] [FR] Revue de Medicine 17(20): 1149-1157. May 17, 1976.

210. ROGOT, E. Smoking and life expectancy among U.S. vererans. American Journal of Public Health 68 (10): 1023-1025. October 1978.

211. ROSENBERG, P.H. and VANTTINEN, H. Occupational hazards to reproduction and health in anaesthetists and paediatricians. Acta Anaesthesiologica Scandinavica 22(3): 202-207. 1978.

212. ROYAL COLLEGE OF GENERAL PRACTITIONERS' ORAL CONTRACEPTION STUDY. Mortality among oral-contraceptive users. Lancet 2(8041): 727-731. October 8, 1977.

213. ROYAL COLLEGE OF PHYSICIANS OF LONDON. Smoking and health. London, Pitman Medical and Scientific Publishing, 1962.

214. ROYAL COLLEGE OF PHYSICIANS OF LONDON. Smoking and health now: a report of the Royal College of Physicians. London, Pitman Medical and Scientific Publishing, 1971. 148 p.

215. RUSH, D. Examination of the relationship between birthweight, cigarette smoking during pregnancy and maternal weight gain. Journal of Obstetrics and Gynaecology of the British Commonwealth 81(10): 746-752. October 1974.

216. RUSH, D. and KASS, E.H. Maternal smoking: a reassessment of the association with perinatal mortality. American Journal of Epidemiology 96(3): 183-196. September 1972.

217. RUSSELL, C.S., TAYLOR, R., and LAW, C.E. Smoking in pregnancy, maternal blood pressure, pregnancy outcome, baby weight and growth, and other related factors: a prospective study. British Journal of Preventive and Social Medicine 22(3): 119-126. July 1968.

218. SANGHVI, L.D. Cancer epidemiology in India: a critique. Indian Journal of Medical Research 62(12): 1850-1870. December 1974.

219. SCHONLAND, M. and BRADSHAW, E. Smoking patterns in Africans and Indians of Natal. International Journal of Cancer 4(5): 743-751. September 1969.

220. SCHORAH, C.J., ZEMROCH, P.J., SHEPPARD, S., and SMITHELLS, R.W. Leucocyte ascorbic acid and pregnancy. British Journal of Nutrition 39(1): 139-149. January 1978.

221. SCHUBERT, D.S.P. Impulsivity and other personality characteristics of cigarette smokers. [Abstract] American Psychologist 14(7): 354-355. July 1959.

222. SCHUMAN, L.M., MANDEL, J., BLACKARD, C., BAUER, H., SCARLETT, J., and MCHUGH, K. Epidemiologic study of prostatic cancer: preliminary report. Cancer Treatment Reports 61(2): 181-186. March-April 1977.

223. SCHWARTZ, D., GOUJARD, J., KAMINSKI, M., and RUMEAU-ROUQUETTE, C. Smoking and pregnancy: results of a prospective study of 6,989 women. [EN, summary in FR] Revue Européenne d'Etudes Cliniques et Biologiques 17(9): 867-879. 1972.

224. SHAPIRO, S., SCHLESINGER, E.R., and NESBIT, R.E.L. Infant, perinatal, maternal and childhood mortality in the United States. Cambridge, Massachusetts, Harvard University Press, 1968. 388 p.

225. SHOPLAND, D. [US Office on Smoking and Health] [Health policies directed at tobacco] Personal communication, January 29, 1979. 2 p.

226. SIMPSON, W.J. A preliminary report on cigarette smoking and incidence of prematurity. American Journal of Obstetrics and Gynecology 73(4): 808-815. April 1957.

227. SMITH, G.M. Personality correlates of cigarette smoking in students of college age. Annals of the New York Academy of Sciences 142: 308-321. March 15, 1967.

228. SPEIGHT, A.N. Carcinoma of the bronchus in Dar es Salaam. East African Medical Journal 51(12): 903-908. December 1974.

229. SPIRA, A., PHILIPPE, E., SPIRA, N., DREYFUS, J., and SCHWARTZ, D. Smoking during pregnancy and placental pathology. Biomedicine [Express] 27(7): 266-270. October 1977.

230. STEELE, R., KRAUS, A.S., and LANGWORTH, J.T. Sudden, unexpected death in infancy in Ontario: Pt. 2. Methodology and findings related to the host. Canadian Journal of Public Health 58(8): 359-364. August 1967.

231. STERLING, T.D. and KOBAYASHI, D. A critical review of reports on the effects of smoking on sex and fertility. Journal of Sex Research 11(3): 201-217. August 1975.

232. STEVENS, D.J. [US Department of Agriculture] [Filter-tip cigarette production figures for developing countries] Personal communication, November 31, 1978. 1 p.

233. STEVENS, D.J. [US Department of Agriculture] [Tobacco consumption patterns in developing countries] Personal communication, November 13, 1978. 1 p.

234. STRAITS, B.C. and SECHREST, L. Further support of some findings about the characteristics of smokers and non-smokers. Journal of Consulting Psychology 27(3): 282. June 1963.

235. SUBAK-SHARPE, G. Is your sex life going up in smoke? Today's Health 52(8): 50-53, 70. August 1974.

236. THOMAS, C.B. Personality differences between smokers and nonsmokers. Maryland State Medical Journal 27(5): 63-66. May 1978.

237. THOMAS, D.B. An epidemiologic study of carcinoma in situ and squamous dysplasia of the uterine cervix. American Journal of Epidemiology 98(1): 10-28. July 1973.

238. TOBACCO INSTITUTE. Tobacco industry profile 1978. Washington, D.C., Tobacco Institute, 1978. 6 p.

239. TODD, G.F. Changes in smoking patterns in the UK. London, Tobacco Research Council, 1975. (Occasional Paper 1) 68 p.

240. TYLECOTE, F.E. Cancer of the lung. Lancet 2(5422): 256-257. July 30, 1927.

241. UNDERWOOD, P., HESTER, L.L., LAFITTE, T., Jr., and GREGG, K.V. The relationship of smoking to the outcome of pregnancy. American Journal of Obstetrics and Gynecology 91(2): 270-276. January 15, 1965.

242. UNDERWOOD, P., KESLER, K.F., O'LANE, J.M., and CALLAGAN, D.A. Parental smoking empirically related to pregnancy outcome. Obstetrics and Gynecology 29(1): 1-8. January 1967.

243. UNITED NATIONS FOOD AND AGRICULTURE ORGANIZATION [UNFAO]. FAO production yearbook — 1977, Vol. 31. Rome, UNFAO, 1978. (FAO Statistics Series 15) 290 p.

244. UNITED STATES DEPARTMENT OF AGRICULTURE. ECONOMICS, STATISTICS, AND COOPERATIVE SERVICE. Tobacco situation. Washington, D.C., USDA, June 1978. (TS-164) 35 p.

245. UNITED STATES DEPARTMENT OF AGRICULTURE. ECONOMICS, STATISTICS, AND COOPERATIVE SERVICE. Tobacco situation. Washington, D.C., USDA, December 1978. (TS-166) 38 p.

246. UNITED STATES DEPARTMENT OF AGRICULTURE. FOREIGN AGRICULTURAL SERVICE. World cigarette production and trade up in 1977. Washington, D.C., USDA, July 1978. (Foreign Agriculture Circular FT-3-78) 18 p.

247. UNITED STATES DEPARTMENT OF AGRICULTURE. FOREIGN AGRICULTURAL SERVICE. World tobacco supply and distribution, 1959-77. Washington, D.C., USDA, June 1978. (Foreign Agriculture Circular FT-2-78) 115 p.

248. UNITED STATES DEPARTMENT OF AGRICULTURE. FOREIGN AGRICULTURAL SERVICE. World tobacco trade down in 1977. Washington, D.C., USDA, August 1978. (Foreign Agriculture Circular FT-5-78) 15 p.

249. UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. CENTER FOR DISEASE CONTROL. Survey of health professionals: smoking and health, 1975: summary report. [1975] 5 p. (Unpublished)

250. UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. NATIONAL CENTER FOR HEALTH STATISTICS. Annual summary for the United States, 1975: births, deaths, marriages, and divorces. Monthly Vital Statistics Report 24(13). June 30, 1976. 26 p.

251. UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. NATIONAL CENTER FOR HEALTH STATISTICS. Vital statistics rates in the United States 1940-1960. Washington, D.C., U.S. Government Printing Office, 1968. (PHS 1677) 881 p.

252. UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. NATIONAL CENTER FOR HEALTH STATISTICS. Weight at birth and survival of the newborn, by age of mother and total-birth order, United States, early 1950. Washington, D.C., U.S. Government Printing Office, July 1965. (PHS 1000-Series 21-No. 5) 73 p.

253. UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. NATIONAL INSTITUTES OF HEALTH. Teenage smoking: national patterns of cigarette smoking, ages 12 through 18, in 1972 and 1974. Rockville, Maryland, DHEW, 1976. (NIH 76-931) 123 p.

254. UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. OFFICE ON SMOKING AND HEALTH. The health consequences of smoking 1977-1978. Rockville, Maryland, DHEW, [1979] 86 p. (In press)

255. UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. PUBLIC HEALTH SERVICE. Adult use of tobacco 1970. Atlanta, Georgia, Center for Disease Control, National Clearinghouse for Smoking and Health, June 1973. (HSM 73-8727) 90 p.

256. UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. PUBLIC HEALTH SERVICE. Adult use of tobacco 1975. Atlanta, Georgia, Center for Disease Control, National Clearinghouse for Smoking and Health, July 1976. 23 p.

257. UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. PUBLIC HEALTH SERVICE. The health consequences of smoking. Atlanta, Georgia, Center for Disease Control, 1976. (HEW-CDC-78-8357) 657 p.

258. UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. PUBLIC HEALTH SERVICE. Smoking and health: report of the Advisory Committee to The Surgeon General of the Public Health Service. Rockville, Maryland, DHEW, 1964. (PHS 1103) 387 p.

259. UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. PUBLIC HEALTH SERVICE. Smoking and health: report of The Surgeon General. Rockville, Maryland, DHEW, January 1979. (Prepublication copy) [1100 p.]

260. URAGODA, C.G. and SENEWIRATNE, B. Tobacco smoking in Ceylon. Journal of Tropical Medicine and Hygiene 74(7): 145-147. July 1971.

261. VAN DEN BERG, B.J. Epidemiologic observations of prematurity: effects of tobacco, coffee and alcohol. In: Reed, D.M. and Stanley, F.J., eds. The epidemiology of prematurity. Baltimore, Maryland, Urban and Schwarzenberg, 1977. p. 157-176.

262. VAN LANCKER, J.L. Smoking and disease. In: Jarvik, M.E., Cullen, J.W., Gritz, E.R., Vogt, T.M., and West, L.J., eds. Research on smoking behavior. Washington, D.C., U.S. Government Printing Office, December 1977. (National Institute on Drug Abuse Monograph 17) p. 230-279.

263. VESSEY, M.P., McPHERSON, K., and JOHNSON, B. Mortality among women participating in the Oxford/Family Planning Association contraceptive study. Lancet 2(8041): 731-733. October 8, 1977.

264. VESSEY, M.P., WRIGHT, N.H., McPHERSON, K., and WIGGINS, P. Fertility after stopping different methods of contraception. British Medical Journal 1(6108): 265-267. February 4, 1978.

265. VICZIAN, M. Ergebnisse von Spermauntersuchungen bie Zigarettenrauchern. [Results of sperm analysis in cigarette smokers] [GE] Zietschrift fuer Haut-und Geschlchtskrankheiten 44(5): 183-187. 1969.

266. VORHERR, H. Drug excretion in breast milk. Postgraduate Medicine 56(4): 97-104. October 1974.

267. WARNER, K.E. The effects of the anti-smoking campaign on cigarette consumption. American Journal of Public Health 67(7): 645-649. July 1977.

268. WEIR, J.M. and DUNN, J.E., Jr. Smoking and mortality: a prospective study. Cancer 25(1): 105-112. January 1970.

269. WILLIAMS, H.S. and MEYER, M.B. Reply to Dr. Yerushalmy on cigarette smoking, infant birth weight, and perinatal mortality rates. [Letter] American Journal of Obstetrics and Gynecology 118(6): 886-888. March 15, 1974.

270. WILLIAMS, R.R. and HORM, J.W. Association of cancer sites with tobacco and alcohol consumption and socioeconomic status of patients: interview study from the Third National Cancer Survey. Journal of the National Cancer Institute 58(3): 525-547. March 1977.

271. WILSON, E.W. The effect of smoking in pregnancy on the placental co-efficient. New Zealand Medical Journal 74(475): 384-385. 1972.

272. WINGERD, J., CHRISTIANSON, R., LOVITT, W.V., and SCHOEN, E.J. Placental ratio in white and black women: relation to smoking and anemia. American Journal of Obstetrics and Gynecology 124(7): 671-675. April 1, 1976.

273. WINGERD, J. and SCHOEN, E.J. Factors influencing length at birth and height at five years. Pediatrics 53(5): 737-741. May 1974.

274. WINKLESTEIN, W. Smoking and cancer of the uterine cervix: hypothesis. American Journal of Epidemiology 106(4): 257-259. October 1978.

275. WORLD HEALTH ORGANIZATION. Nutritional anaemias. Geneva, WHO, 1972. (Technical Report Series 503) 29 p.

276. WORLD HEALTH ORGANIZATION. Nutritional anaemias. Geneva, WHO, 1968. (Technical Report Series 405) 37 p.

277. WORLD HEALTH ORGANIZATION. Smoking and its effects on health: report of a WHO expert committee. Geneva, WHO, 1975. (Technical Report Series 568) 100 p.

278. WORLD HEALTH ORGANIZATION. World health statistics annual, 1967. Vol. 1. Geneva, WHO, 1970. 783 p.

279. WRIGHT, N.H. [Smoking and female fecundity] Personal communication, November 16, 1978. 1 p.

280. YERUSHALMY, J. Cigarette smoking, infant birth weight, and perinatal mortality rates. [Letter] American Journal of Obstetrics and Gynecology 118(6): 884-888. March 15, 1974.

281. YERUSHALMY, J. Congenital heart disease and maternal smoking habits. Nature 242(395): 262-263. March 23, 1973.

282. YERUSHALMY, J. Infants with low birth weight born before their mothers started to smoke cigarettes. American Journal of Obstetrics and Gynecology 112(2): 277-284. January 14, 1972.

283. YERUSHALMY, J. The relationship of parents' cigarette smoking to outcome of pregnancy: implications as to the problem of inferring causation from observed associations. American Journal of Epidemiology 93(6): 443-456. June 1971.

284. YERUSHALMY, J. Smoking in pregnancy. [Letter] Developmental Medicine and Child Neurology 15(5): 691-693. October 1973.

285. ZABRISKIE, J.R. Effect of cigarette smoking during pregnancy: study of 2,000 cases. Obstetrics and Gynecology 21(4): 405-411. April 1963.

ADDENDA

286. ARYA, O.P. and FOWKES, B.A. Polluting the microenvironment: smoking in Uganda. World Medical Journal 18(5): 96-100. September-October 1971.

287. ASHCROFT, M.T. and STUART, K.L. Acute myocardial infarction in the University Hospital, Jamaica, 1968-1970. West Indian Medical Journal 22(2): 60-66. June 1973.

288. BEWLEY, B.R. and BLAND, J.M. Smoking and respiratory symptoms in two groups of schoolchildren. Preventive Medicine 5: 63-69. 1976.

289. BEWLEY, B.R., HALIL, T. and SNAITH, A.H. Smoking by primary schoolchildren: prevalence and associated respiratory symptoms. British Journal of Preventive and Social Medicine 27: 150-153. 1973.

290. BROMAN, S.H., NICHOLS, P.L., and KENNEDY, W.A. Preschool IQ: prenatal and early developmental correlates. Hillsdale, New Jersey, Lawrence Erlbaum Associates, 1975. 325 p.

291. DeJONG, U.W., BRESLOW, N., GOH EWE HONG, J., SRIDHARAN, M., and SHANMUGARATNAM, K. Aetiological factors in oesophageal cancer in Singapore Chinese. International Journal of Cancer 13(3): 291-303. March 15, 1974.

292. HILL, G.L., MOELJONO, J., TUMEWU, F., BRATAAMADJA, D., and TOHARDI, A. "Asian cigarette" is an adverse prognostic factor in peripheral arterial disease. Nature 246(5434): 492-493. December 21-28, 1973.

293. JAFAREY, N.A. and ZAIDI, S.H.M. Carcinoma of the oral cavity and oropharynx in Karachi (Pakistan): an appraisal. Tropical Doctor 6(2): 63-67. April 1976.

294. JOSHI, R.C., MADAN, R.N., and BRASH, A.A. Prevalence of chronic bronchitis in an industrial population in North India. Thorax 30(1): 61-67. February 1975.

295. LEUNG, J.S.M. Cigarette smoking, the kerosene stove and lung cancer in Hong Kong. British Journal of Diseases of the Chest 71(4): 273-276. October 1977.

296. MALIK, S.K. Chronic bronchitis in North India. [Letter] Chest 72(6): 800. December 1977.

297. NAFAE, A., MISRA, S.P., DHAR, S.N., and AHMAD SHAH, S.N. Bronchogenic carcinoma in Kashmir Valley. Indian Journal of Chest Diseases 15(4): 285-295. October 1973.

298. PATHMANATHAN, I. Tobacco smoking patterns in a rural community in Negri Sembilan. Medical Journal of Malaysia 29(1): 34-39. September 1974.

299. RANTAKALLIO, P. Groups at risk in low birth weight infants and perinatal mortality: a prospective study of the biological characteristics and socio-economic circumstances of mothers in 12,000 deliveries in North Finland 1966: a discriminant function analysis. Acta Paediatrica Scandinavica (Suppl. 193): 1-71. 1969.

300. REDDY, C.R.R.M. Carcinoma of hard palate in India in relation to reverse smoking of chuttas. Journal of the National Cancer Institute 53(3): 615-619. September 1974.

301. RICHARDS, I.D.G. Congenital malformations and environmental influences in pregnancy. British Journal of Preventive and Social Medicine 23(4): 218-225. November 1969.

302. RUSH, D. Changes in respiratory symptoms related to smoking in a teenage population: the results of two linked surveys separated by one year. International Journal of Epidemiology 5(2): 173-178. June 1976.

303. SEHGAL, A.K., CHHUTTANI, P.N., GUPTA, B.B., MALIK, K., and GUPTA, H.D. Epidemiology of peptic ulcer in an urban community in Chandigarh. Indian Journal of Medical Research 59(10): 1612-1620. October 1971.

304. SRIVASTAVA, S.P. Carcinoma of the cheek and gingivae. International Surgery 60(9): 472-473. September 1975.

305. TODA, Y., MORI, H., SABDOADI, HOEPOEDIONO, KOENTO R., SOEDARJO, KARTINI S., and LOLONG L.A. Observation of health and daily life in Surabaja City in Indonesia. Kobe Journal of Medical Sciences 16(1): 119-130. December 1970.

306. WAPNICK, S., CASTLE, W., NICHOLLE, D., ZANAMWE, L.N.D., and GELFAND, M. Cigarette smoking, alcohol and cancer of the oesophagus. South African Medical Journal 46(51): 2023-2026. December 23, 1972.

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Population Reports

Series B
Number 3
May 1979

INTRAUTERINE DEVICES

Population Information Program, The Johns Hopkins University, Hampton House, 624 North Broadway, Baltimore, Maryland 21205, USA

IUDs — Update on Safety, Effectiveness, and Research

Summary. After nearly two decades of use, the IUD remains "a generally safe, effective and useful form of birth control" (337). With fewer than six pregnancies per 100 woman-years of use and fewer than ten deaths per one million woman-years of use, according to a comprehensive new review by the United States Food and Drug Administration, the IUD has an important place in modern family planning programs.

The number of women using IUDs is growing slowly but steadily. Most extensive use is in the People's Republic of China, where visitors have been told that half or more of all those using contraception have accepted IUDs. In Korea and Taiwan, where successful programs have been underway since the mid-1960s, the IUD is also the principal method. In about a dozen other developing countries more than 5 percent of all married women of reproductive age use IUDs. In Europe IUD use ranges from less than 5 percent in Italy to as high as 20 percent in Scandinavian countries. In the USA about 6 percent of married women of reproductive age have IUDs. Worldwide, approximately 50 to 60 million devices may be in use, 40 million or more in China and 15 million in the rest of the world.

Nevertheless, despite extensive experience and continuing research in both developed and developing countries, some of the original problems of IUD use remain unresolved and some of the promising new solutions remain unproven. The basic problems of IUD use are:

- increased menstrual bleeding or spotting
- expulsion soon after insertion
- increased frequency of pelvic infection
- unwanted pregnancies that are more likely to be ectopic or to result in septic midtrimester abortion than pregnancies in nonusers

The promising new approaches that could minimize or eliminate some of these problems include:

- medicated devices that are effective up to 10 years
- medicated devices with compounds to reduce bleeding
- devices designed to reduce expulsion after early postpartum and postabortion insertion
- improved fit of IUD size and configuration to the uterus
- better insertion techniques and instrumentation

Experience with the IUD throughout the world has demonstrated that within certain limits clinical and individual factors may have more impact on continuing IUD use than the design of the device itself. The skill of the health personnel, whether physician, midwife, or other auxiliary, and the care and follow-up provided may produce more satisfied users than does the latest permutation of device. With this recognition, attention is now focusing on specific techniques of insertion, training of personnel, and conscientious follow-up. The result has been improved performance over the years with the first generation of IUDs, especially the Lippes Loop, which for the last decade has been the standard device against which others were measured.

To ensure best results, proper insertion is crucial. The IUD must be inserted gently and high into the uterine fundus. New measuring devices may well facilitate selection and precise placement of the right size of device. For postpartum use, a longer inserter or even hand insertion may be most effective. The withdrawal technique of insertion, in which the inserter is placed in position, the IUD released, and the inserter then withdrawn from the uterus, results in fewer perforations than the original technique of pushing the device out of the inserter. Many clinicians find the T- and 7-shaped devices easier to insert than the more complex configurations with a larger surface area.

In the past IUD insertion was often limited to the time during and immediately after menstruation or more than eight weeks after delivery. Now, even though many centers still follow these traditional patterns, data show that IUDs can be safely inserted at any time (including immediately after abortion) provided the woman is reasonably sure she is not pregnant. Unless there are specific medical contraindications, IUDs can be inserted at the convenience of the woman.

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Good clinical management includes counseling the IUD user, explaining potential problems clearly, and providing sympathetic management both of immediate postinsertion complications and of long-term side effects. (A summary guide for clinicians that can be detached and displayed on the wall is included on pages B-74–B-75.)

A second generation of IUDs contains pharmacologically active substances such as metallic copper or progestational steroids that are released into the uterine cavity. The Cu-7 and the TCu-200 have been available for several years. Most studies show reduced bleeding and lower expulsion rates with copper devices, which are better tolerated by nulliparous women than inert IUDs. The Progestasert, which releases into the uterine cavity about 65 μg of progesterone a day over a period of one year, reduces menstrual bleeding but may be associated with more ectopic pregnancies. Three issues should be resolved before medicated devices are incorporated on a large scale into national programs: (1) what is the effective life of the devices before the active ingredient is exhausted? (2) what provision should be made for replacement if the contraceptive effect is diminished? and (3) what long-term toxicity and other adverse effects should be considered and/or disproved?

In addition to commercially available devices, other medicated IUDs are being used on an experimental basis. These include the Population Council's copper devices with 220 or 380 sq mm of copper surface area. They contain copper sleeves on the transverse bars of the T, where the copper reaches the uterine fundus more effectively and lasts longer, as well as on the vertical arm. Other experimental devices containing antifibrinolytic substances for release into the uterus to reduce bleeding directly are now being tested by the International Fertility Research Program. The World Health Organization's Special Programme of Research in Human Reproduction is testing a T device designed to release 2 μg a day of the progestin levonorgestrel for a minimum of five years with a substantially reduced menstrual blood loss. Because anemia is a serious problem for women in developing countries, any modification that could reduce bleeding without causing other problems would be extremely useful.

One variation that is being tested to reduce expulsions of devices inserted immediately after delivery or abortion is to affix short chromic sutures to the upper horizontal bar of the device. The chromic suture material, which is biodegradable and dissolves within a few weeks, helps to anchor the device, since the chromic projections make the device larger at the time of insertion and then temporarily embed in the uterus as the uterus returns to normal size.

Even as solutions are being proposed for bleeding and expulsion problems, however, new data suggest that the risk of infection which helped to discredit IUDs earlier in the century may still be significant. Higher rates of both diagnosed infection and asymptomatic inflammation have been found among IUD users, especially among young, sexually active women in the developed countries, where pelvic inflammatory disease (PID) is often a sexually transmitted disease. It is possible that PID may lead to infertility among older women. Moreover, when pregnancy occurs with an IUD in situ the risk of an ectopic pregnancy or a septic midterm abortion is higher than in nonusers. Roughly estimated, one in 30 pregnancies in IUD users is ectopic compared with one in 250 in large populations. Better protection against uterine than ectopic pregnancy for IUD users may explain this difference. Whether other mechanisms are also at work is not clear. The dangers of ectopic pregnancy, especially in developing countries where emergency surgical care is scarce, and the similarity of symptoms to IUD-related bleeding and pain require health care personnel to be especially alert to the possibility of ectopic pregnancy. Septic midtrimester abortions in women whose IUDs remained in place during pregnancy have lead to a small number of deaths reported in the US. Removing the device as soon as pregnancy is detected appears to reduce markedly the risk of this and other complications of uterine pregnancy.

With the IUD as with oral contraceptives, it is possible that widespread use and extensive research will identify more relatively rare but potentially serious complications. These must be viewed in the perspective of overall risks and benefits. In developing countries where maternal mortality may be 200 to 300 per 100,000 births, mortality from IUD use is estimated to be in the range of only 1 to 3 deaths annually per 100,000 users. In terms of mortality, IUDs are about twice as safe as oral contraceptives used by young women without conditions predisposing them to circulatory disease and three to five times safer than OCs used by older women. Thus the IUD is a safe and reasonable choice for individual women and for family planning programs.

HISTORY

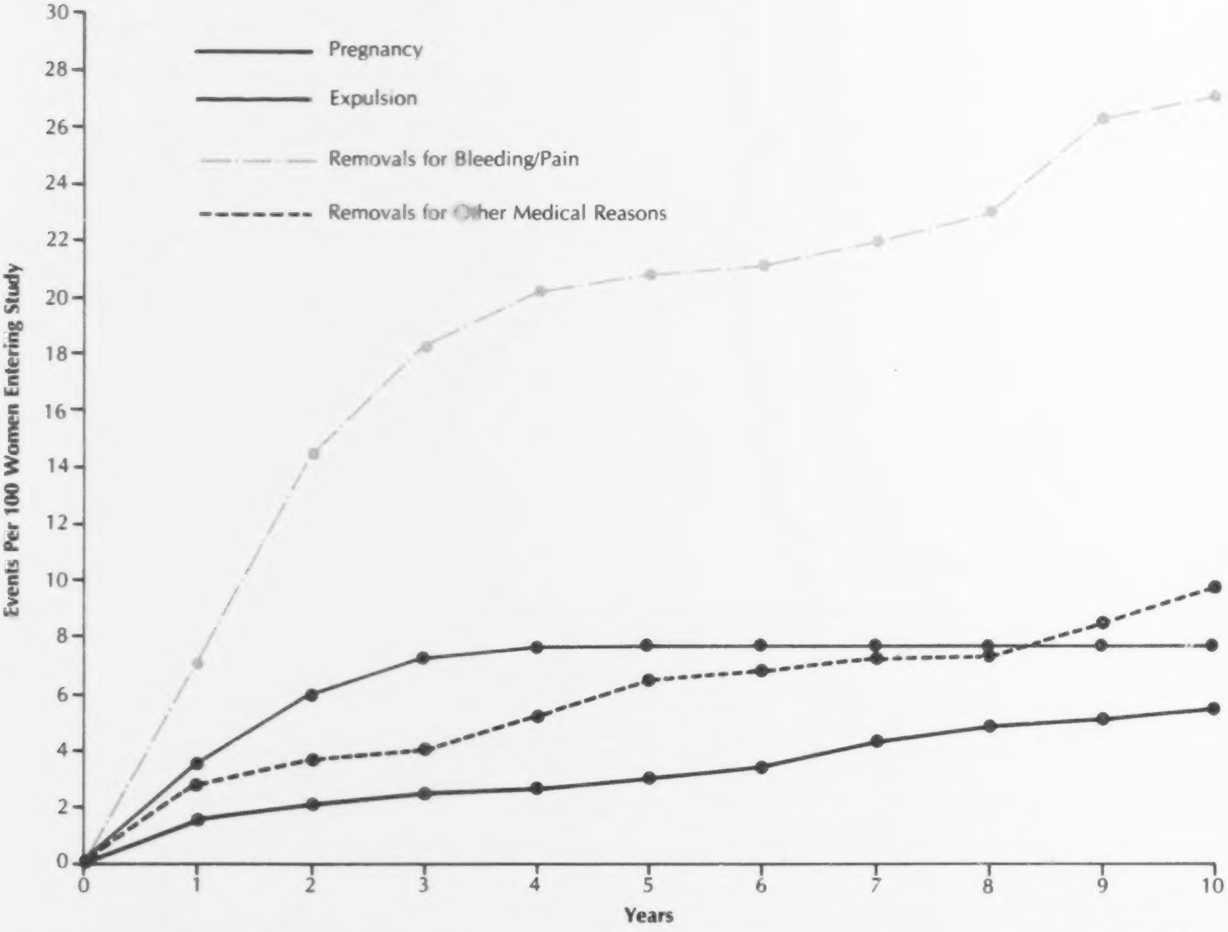
The millions of intrauterine devices in use throughout the world today represent the modern application of an ancient concept. The first IUDs may have been pebbles inserted into the uteri of camels by Arabs and Turks who wanted to protect their saddle animals from pregnancy during long desert treks (60,337). In humans, the use of contraceptive pessaries was reported in the 11th century by the Islamic scientist Avicenna. During the late 19th century, stem pessaries made from materials as common as pewter and as exotic as diamond-studded platinum were in use (290). These were technically not intrauterine devices since they did not rest entirely within the uterus; the bulk of the device remained in the vagina while the stem extended through the cervical canal and protruded into the uterine cavity. They were inserted to correct uterine position and induce abortion as well as to prevent pregnancy (60).

The first IUD designed solely for human contraception was developed in 1909 by a German physician, Richard Richter. The device was ring-shaped and made of silkworm gut (234). Silkworm threads were also incorporated in a cervico-uterine device developed in 1923 by K. Pust, who combined the silkworm ring with the older stem pessary (227). Pust reported no pregnancies or serious complications among 453 women in whom he inserted the device. He distributed his IUD to other physicians, but many refused to use it on the grounds that such a device would produce pelvic infection (269).

The first IUD to be widely used was a ring of gut and silver wire, developed by Ernst Gräfenberg (75), which became popular in Germany in the late 1920s. In 1934, Tenrei Ota of Japan introduced gold and gold-plated silver intrauterine rings which he claimed were more efficacious than Gräfenberg's device (210).

Although enthusiasm greeted both devices initially, it was soon replaced by skepticism and even condemnation that branded them ineffective and dangerous. In 1936 the Japanese govern-

Figure 1. Ten-year Cumulative Rates of Pregnancy, Expulsion, Removals for Bleeding/Pain, and Removals for Other Medical Reasons, Lippes Loops C and D
(net cumulative rates)



Ten years of experience with the widely used Lippes Loop shows that bleeding and pain are the principal reasons for discontinuation, followed by expulsion, other medical reasons, and pregnancy.

Source: Lippes (163)

ment prohibited their use. Gräfenberg was forced to abandon his ring because of opposition by European physicians. Before the development of antibiotics, physicians were reluctant to adopt any method that might increase the risk of pelvic infection.

The conservative medical attitude toward IUDs lasted until the late 1950s, when technological progress prompted a reappraisal. To stimulate an objective international evaluation of IUDs, the Population Council in 1962 convened the first international conference on IUDs in New York. Physicians from the United States, Israel, Germany, and other countries reported favorable experience with IUDs (324).

In addition to advances in antibiotic therapy, which dispelled fears of uncontrollable infection, the technological factor that was crucial to acceptance of IUDs was the development of polyethylene, a biologically inert plastic that could be molded into any desired configuration and would return to that configuration after being bent or straightened. The Margulies Coil and the Lippes Loop were the first widely used plastic IUDs. Both could usually be inserted without cervical dilatation. They were first placed in a straight, narrow tube and then extruded into the uterus, where they resumed their original shape. Jack Lippes, of the US, added two important features to the device that bears his name, both of which most subsequently developed IUDs have incorporated: a transcervical thread to assist in detecting and removing the device and a small amount of barium sulfate to render the device opaque to x-rays (161).

Following the 1962 conference, the Population Council established the Cooperative Statistical Program (CSP) to undertake a broad evaluation of IUDs and, in 1964, held a second conference (264). Under the direction of Christopher Tietze, the CSP studied several types of IUDs, including Lippes Loops A, B, C, and D, the Margulies Spiral, large and small Birnberg bows, steel rings, double coils, and several others. This international evaluation involved some 27,000 insertions and over 39,000 woman-years of use. In order to compare the efficacy and safety of different devices studied over various time periods, investigators adopted life table analysis, an actuarial technique that measures the rates of critical events — pregnancies, expulsions, and removals — at various intervals after insertion. Life table rates are often expressed as, for example, the number of pregnancies, expulsions, or removals per 100 women at one, two, or three years of use (276, 323).

Tietze's evaluation demonstrated that the IUD was a safe and effective method of contraception appropriate for use in national family planning programs, many of which were being initiated at that time (322). He concluded that:

> No single type of IUD has consistently lower rates than the others for all types of events (pregnancies, expulsions, and removals), nor does any one IUD have consistently higher rates than the others (323).

By the mid-1970s, following a decade of continuing research on IUD design and worldwide experience with IUDs in national family planning programs, two major reviews of IUD development took place, a workshop sponsored by the Battelle Memorial Institute in Seattle in October 1973 (361) and a third international conference sponsored by the Population Council in Cairo in April 1974 (106). At both sessions, the focus of attention on IUDs was shifting to a so-called second generation of devices. These were the bioactive or medicated devices, in which the plastic IUD became a carrier for other substances such as metals, hormones, and antibleeding agents. (Originally "inert" and "bioactive," the preferred terminology has since become "unmedicated" and "medicated." All IUDs are recognized to stimulate a local reaction.) Earlier work had clearly shown that the larger devices, while reasonably effective in preventing pregnancy and resisting expulsion, had high removal rates for bleeding and pain (45, 267). Small devices, on the other hand, were easier to insert, created less bleeding and pain, but produced higher pregnancy and expulsion rates (310).

In the first medicated devices, developed by Jaime Zipper and Howard Tatum, copper wire was wrapped around the T or 7 devices, which had a relatively small surface area, to improve their contraceptive efficacy (302, 317, 383). Shortly thereafter, hormones were incorporated in various devices in order to deliver some of the same steroids which had proved effective in oral contraceptives directly to the uterus in much smaller doses. Somewhat later, other compounds designed to reduce the heavy menstrual bleeding associated with IUDs were also incorporated in different IUDs. Meanwhile research continued on different configurations of IUDs that would be more suitable for nulliparas, provide better protection against pregnancy, resist expulsion, and minimize other complications in case of perforation or accidental pregnancy.

The course of IUD development is not complete. But in two decades an ancient concept has been reactivated, improved by modern technology, subjected to international clinical scrutiny, and, despite acknowledged shortcomings, now finds an important place in modern contraceptive practice and in national family planning programs.

DISTRIBUTION AND USAGE

The IUD has proved a useful addition to family planning programs in developed and developing countries. For the individual user, the IUD offers the advantages of a relatively safe, effective, and convenient method that does not require repetition and does not interfere with sexual activity. For the family planning program administrator, plastic IUDs can be locally manufactured, inexpensively purchased, easily shipped and stored, and can be inserted by trained paramedical personnel (see p. B-61). IUDs, like other contraceptives, are provided free of charge for programs by a number of government, private, and international agencies.

Figures on IUD usage are difficult to gather since devices are made by many different manufacturers and distributed both through private physicians and public clinics. In developed countries, the most accurate estimates of current use are derived from national surveys, but these are often confined to ever-married or currently married women of specified ages or to other specific groups. In the industrialized countries, IUD use is highest in Finland and Sweden, with about 20 percent of married women of reproductive age using various devices; in France, Japan, and Denmark, with 7 to 9 percent; and in the US and Britain, with about 6 percent (1, 62, 200) (see Table 1).

In the US, surveys show that IUD use grew from less than 0.7 percent of married women of reproductive age in 1965 to 6.7 percent in 1973 and then declined to 6.1 percent in 1976 (62), perhaps as a result of adverse publicity on septic abortions (see

Table 1. . Estimated Percentage of Married Women of Reproductive Age Using Intrauterine Devices in Selected Developed Countries, 1974-1978

Country	Ref. No.	Date	Percent of MWRA All Methods[1]	 IUD
Belgium[2]	1	1975-76	87	3
Denmark[3]	1	1977-78	92	8
England & Wales	1	1975	76	6
Finland	253	1975-78	NA	20
France	153	1978	67	9.1
Hungary	200	1974	75	2
Italy	1	1976-77	NA	3
Japan[3]	190	1977	60	7
Netherlands	200	1975	71	4
Sweden	1	1977	75	19
United States	62	1976	69	6.1

[1] Including sterilization
[2] Dutch-speaking population only
[3] Contraceptive method last used, not necessarily currently in use

p. B-69). In Europe, IUD use is thought to be increasing (354). Among the nearly 2 million US users, as Table 2 shows, the Lippes Loop is most widely used, followed by the Cu-7, Dalkon Shield, and Saf-T-Coil (62).

Developing Countries

In developing countries IUDs are manufactured locally, sometimes on license from larger manufacturers, or in many cases provided by donor agencies, both public and private, such as the US Agency for International Development (USAID), the UN Fund for Population Activities (UNFPA) through the UN Children's Fund (UNICEF) and the World Health Organization (WHO), the Swedish International Development Authority (SIDA), the International Planned Parenthood Federation (IPPF), the Population Council, Family Planning International Assistance (FPIA), and the Pathfinder Fund.

For the last decade, the major provider of IUDs, either directly to other governments or indirectly through private agencies, has been USAID. A total of more than 9 million devices, almost entirely Lippes Loops, has been provided since 1968. Approximately 632,000 were delivered in 1978, down from the peak of 1.4 million in 1973 (see Table 3, p. B-90). USAID is planning to provide copper-clad devices for the first time in late 1979. IPPF has been distributing copper T devices since 1976 and will supply more than 150,000 in 1979, the majority of them to family planning associations in Chile and Colombia (78).

Table 2. Use of IUDs by Ever-married Women in the United States, by Marital Status and Type of IUD, 1976

Marital status	Number of women in thousands	Type of IUD Lippes Loop	 Saf-T-Coil	 Cu-7	 Dalkon Shield	 Other
Currently married	1,582	35.2	13.1	30.2	15.3	6.2
Widowed, divorced, or separated	311	48.5	15.8	24.6	8.8	2.2

Source: Ford (62)

Table 7. Percentage of Married Women of Reproductive Age* Using Intrauterine Devices in Selected Developing Countries, as Reported in World Fertility Surveys, 1974-1976

Country	Date	Percent of MWRA All Methods	 IUD
ASIA			
Fiji	1974	40	5
Korea, South	1974	35	8
Malaysia	1974	33	1
Nepal	1976	2	0
Pakistan	1975	5	1
Sri Lanka	1975	33	5
Thailand	1975	33	6
WESTERN HEMISPHERE			
Colombia	1976	42	8
Costa Rica*	1976	64	5
Dominican Republic	1975	31	3
Panama*	1976	54	4

*Aged 15-44, except in Costa Rica and Panama, 20-49

Source: Adapted from **Population Reports**, Series A, Number 5 (235)

The UNFPA is also funding the purchase of an increasing number of IUDs for developing country programs, with the actual procurement undertaken by UNICEF (about 97 percent) and WHO (about 3 percent). Between 1974 and 1978, UNFPA has funded purchases (or shipments from the stockpile) of nearly 5 million IUDs for UNICEF and WHO, of which about 1.8 million were in 1978 (see Tables 4 and 5, p. B-91). These were primarily Lippes Loops and TCu-200s (19).

The Swedish International Development Authority has provided nearly 5 million IUDs to developing countries since 1967 (see Table 6, p. B-92). Of these, 3 million Dana Super devices, made in Czechoslovakia (see Figure 22, B-89), were sent to Vietnam; about one million, mainly Lippes Loops, to Sri Lanka; almost 700,000, mainly Lippes Loops, to Cuba; and 250,000, also mainly Lippes Loops, to Kenya. About half the shipments were made in 1977 (304).

The best estimates of IUD usage in developing countries come from the World Fertility Survey, but they are not available for most countries yet. Table 7 shows that, of the countries with data available, South Korea and Colombia have the highest IUD usage rates — 8 percent of married women of reproductive age — followed by Thailand with 6 percent, and Fiji, Sri Lanka, and Costa Rica with 5 percent. Other estimates by USAID and the Population Council suggest that IUD prevalence may reach or exceed 5 percent in Egypt, Tunisia, Indonesia, Ecuador, Jamaica, Mexico, and Paraguay, as well. In Taiwan, the Population Council estimates, 32 percent of married women of reproductive age use IUDs (see Table 8). In the People's Republic of China, half or more of rural contraceptors may be using IUDs (41, 262).

Data on new acceptors from 22 national family planning programs provide a further indication of IUD use, but new acceptor data (see Table 9, p. B-92) are difficult to interpret because they do not reveal the number of continuing IUD users or the duration of use. Population Council figures, gathered from 1968 to the present, show an increase since 1974 in both the number and proportion of IUD acceptors in only one country, Kenya; IUD acceptors as percentages of total acceptors have declined since 1974 in 14 countries — Egypt, Morocco,

Table 8. Two Estimates of Number (in Thousands) and Percentage of Married Women of Reproductive Age (MWRA) Using All Methods of Contraception and Using Intrauterine Devices, by Source of Supply and Service in 36 Countries, Calculated by Population Council and US Agency for International Development, 1975-1978

	Population Council Data						USAID Data	
	Commercial Sector		Government Sector		All Sources		Organized Programs	
	No. of Users	% of MWRA	No. of Users	% of MWRA	No. of Users	% of MWRA	No. of Users	% of MWRA
AFRICA								
Egypt[1] 1975								
All Methods					1,085	21		
IUDs					**473**	**9**		
Ethiopia 1977								
All Methods							31.0	0.6
IUDs							**0.6**	**0.0**
Ghana 1977								
All Methods			42.1	2.1	42.1	2.1		
IUDs			**3.5**	**0.2**	**3.5**	**0.2**		
Kenya 1977								
All Methods							96.9	4.9
IUDs							**20.0**	**1.0**
Mauritius 1978								
All Methods	4.2	3.4	61.6	49.2	65.8	52.5		
IUDs			**1.9**	**1.5**	**1.9**	**1.5**		
Morocco[2] 1977								
All Methods							165.0	6.2
IUDs							**35.0**	**1.3**
Tunisia 1977								
All Methods			137	17.0			199.3	21.9
IUDs	**1.6**	**0.2**	**50**	**6.2**	**51.6**	**6.4**	**71.6**	**7.9**
Zaire 1977								
All Methods							12.2	0.3
IUDs							**2.6**	**0.1**
ASIA								
Afghanistan 1977								
All Methods							23.7	1.1
IUDs							**1.4**	**0.1**
Bangladesh 1977								
All Methods					1,600	8.9	1,716.6	12.8
IUDs					**191**	**1.1**	**127.2**	**0.9**
Fiji 1978								
All Methods	3	3	31	34	34	38		
IUDs			**5**	**5**	**5**	**5**		
Hong Kong 1978								
All Methods	164	32	234	45	398	77		
IUDs	**2**	**0.4**	**10**	**2**	**12**	**2**		
India[3] 1977								
All Methods			24,949	23.4			26,082.0	24.4
IUDs			**1,429**	**1.3**			**1,482.0**	**1.4**
Indonesia 1978								
All Methods			4,370	23.0			4,318.7	20.2
IUDs			**1,476**	**7.8**			**1,459.0**	**6.8**
Iran 1978								
All Methods	453	8.1	905	16.2	1,358	24.3		
IUDs			**126**	**2.3**	**126**	**2.3**		
Korea, Republic of 1977								
All Methods	1,035	21.7	1,059	22.2	2,094	43.9	1,440.2	28.2
IUDs	**48**	**1.0**	**453**	**9.5**	**501**	**10.5**	**179.0**	**3.5**
Malaysia 1977								
All Methods	140	9	420	27	560	36		
IUDs	**9**	**0.5**	**8**	**0.5**	**17**	**1**		
Nepal 1977								
All Methods							107.1	4.3
IUDs							**1.9**	**0.1**
Pakistan[4] 1975								
All Methods					780	6	1,760.6	14.5
IUDs							**190.4**	**1.6**
Philippines 1977								
All Methods			1,200	22.0	1,200	22.0	1,348.9	24.0
IUDs			**200**	**3.8**	**200**	**3.8**	**113.3**	**2.0**

Table 8 (Continued)

	Population Council Data						USAID Data	
	Commercial Sector		Government Sector		All Sources		Organized Programs	
	No. of Users	% of MWRA	No. of Users	% of MWRA	No. of Users	% of MWRA	No. of Users	% of MWRA
Singapore 1978								
All Methods	51	18	153	53	204	71	153.4	57.2
IUDs	**2**	**1**	**7**	**2**	**9**	**3**	**7.0**	**2.6**
Taiwan 1978								
All Methods	583	27	830	38	1,413	65		
IUDs	**207**	**9**	**501**	**23**	**708**	**32**		
Thailand[5] 1977								
All Methods					1,677	32.3	1,750.1	31.2
IUDs			**358**	**6.9**	**358**	**6.9**	**270.1**	**4.8**
WESTERN HEMISPHERE								
Colombia[2] 1977								
All Methods	698	22.5	810	26.1	1,508	48.6	892.0	33.6
IUDs			**312**	**10.1**	**312**	**10.1**	**349.3**	**13.2**
Costa Rica[2] 1976								
All Methods					78.8	33.7	112.0	48.5
IUDs					**8.1**	**3.5**	**9.0**	**3.9**
Dominican Republic 1978								
All Methods			133	12.8			140.7	23.7
IUDs			**15**	**1.4**			**14.9**	**2.5**
Ecuador 1975								
All Methods					51.7	6.3	96.2	12.0
IUDs					**26.9**	**3.3**	**40.2**	**5.0**
El Salvador 1976								
All Methods	26	3.1	61	7.3	87	10.4	176.4	27.6
IUDs	**2**	**0.2**	**11**	**1.3**	**13**	**1.5**	**19.2**	**3.0**
Guatemala 1977								
All Methods							66.9	7.6
IUDs							**8.3**	**0.9**
Haiti 1976								
All Methods					41	5	192.0	19.9
IUDs							**4.8**	**0.5**
Jamaica 1977								
All Methods							85.3	42.0
IUDs							**13.0**	**6.4**
Mexico[6] 1976								
All Methods	800	9	1,015	12	1,815	21		
IUDs	**90**	**1**	**645**	**7**	**735**	**8**		
Nicaragua 1977								
All Methods							62.2	22.5
IUDs							**12.0**	**4.3**
Panama[7] 1975								
All Methods					175	44	59.8	32.1
IUDs					**12**	**3**	**10.9**	**5.9**
Paraguay 1975								
All Methods					49	10	90.3	27.0
IUDs							**22.3**	**6.7**
Peru[2] 1977								
All Methods							19.3	1.0
IUDs							**7.4**	**0.4**
Total IUDs Column	**361.6** **(308.0)**[9]		**5,611.4** **(1,300.4)**[10]		**3,764.0**[8]		**4,472.4**	
Estimated Total Program Use							**5,772.8**[11]	

Note: Population Council data are for January of specified year unless otherwise noted; 1978 data unpublished. USAID data are for 4th quarter of 1977 unless otherwise noted.

[1] Egypt — USAID data based on 4th quarter 1976

[2] Morocco, Colombia, Costa Rica, Peru — USAID data for 2nd quarter 1977; PC, Costa Rica, women aged 20-49

[3] India — PC data as of March 1977

[4] Pakistan — PC estimate based on 1975 Pakistan Fertility Survey; MWRA are aged 15-49

[5] Thailand — PC estimate based on World Fertility Survey

[6] Mexico — PC data as of June 1976

[7] Panama — USAID data for 3rd quarter 1977

[8] India, Indonesia, Dominican Republic not included in column 5 (PC: All Sources)

[9] Excludes all countries included in column 7 (USAID: Organized Programs)

[10] Excludes countries for which USAID data are given in columns 7 and 8 (USAID: Organized Programs)

[11] Total USAID IUD users plus PC Government Section IUD users not included in column 7 (USAID: Organized Programs), i.e., 1,300.4

Source: Nortman and Hofstatter (203, 204) and USAID (330)

Tunisia, Afghanistan, Bangladesh, India, Iran, the Philippines, Taiwan, Thailand, Costa Rica, the Dominican Republic, Ecuador, and El Salvador — even though in some cases the actual number of new IUD acceptors has increased. This is because the use of other methods such as oral contraceptives and sterilization has increased even more rapidly (200-204).

China

If the data provided to visitors are accurate, the IUD is the major contraceptive method used in the People's Republic of China (32, 41, 233, 262). While provincial and national data on the prevalence of different contraceptive methods have not been released — if indeed they exist — several apparently knowledgeable officials have suggested that as many as 50 to 70 percent of Chinese contraceptors use IUDs. In a briefing given to members of the US-China People's Friendship Association National Medical Delegation on November 17, 1978, in Peking, as reported by Leslie Corsa, Comrade Su Chun of the Division of Scientific Research and Techniques of the Birth Planning Office, State Council of the People's Republic, stated:

> About the methods used in birth planning — in the rural areas most women use IUDs while in the cities women prefer oral drugs. About 50 percent of women of reproductive age using contraception in China use IUDs. . . . In some rural areas 60 to 70 percent use IUDs, but on the average nationwide, 50 percent (41).

This accords with other recent statements. In his diary of a 1977 trip to China, Sheldon Segal noted an even higher figure cited by a Chinese physician:

> Dr. Chang Tse-Feng is in charge of family planning at Capitol Hospital, Peking. She is a graduate of Peking Union Medical College, a member of the last class to finish before the Japanese takeover. Dr. Chang says that a conservative estimate of the percentage of contraceptors in Peking who use intrauterine devices is 60-70 percent. This figure startled me so that I questioned it. The Chinese physicians present, including Dr. Lin Chiao-Chih, seemed to have no doubt about it. In fact, in response to my question on the matter, Dr. Lin stated that she believes that the figure would be a good estimate for all of China. She says, if anything, in the rural areas the percent of contraceptors using the IUD is even greater. Dr. Chang, with Dr. Lin's confirmation, estimates that users of oral contraceptives of all types represent about 20 percent of contracepting couples. Approximately 20 percent are couples which have had sterilization operations, either male or female, but mostly female. Dr. Lin states that there is now a growing transfer from IUDs or oral contraception to sterilization after the first or second child. Abortion is available as a backup throughout China, according to Dr. Lin and Dr. Chang (262).

Table 10. Estimated Number of IUD Users Worldwide, 1977

	Millions of Women	
Developed Country Users		
North America	3	±0.5
Europe	3	±1.0
Asia	1	±0.5
Developing Country Users		
National Programs	8	± 3
People's Republic of China		
900 million people × 70% use of contraceptives × 50% using IUDs × 13% MWRA	41	±10
TOTAL	56	±15

MWRA = married women of reproductive age

Estimating Total Usage

Determining IUD use worldwide is difficult. Program statistics are not always reliable, private physicians do not report IUD insertions, commercial firms do not make sales records public, and national continuation rates vary widely. Moreover, since the People's Republic of China probably has the largest number of users and only very rough estimates are available there, the problem is compounded. Nevertheless, Table 10 provides a crude overview of world use of IUDs in 1978. Approximately 50 to 60 million devices may be in use, 40 million or more in China and 15 million in the rest of the world.

SAFETY AND EFFECTIVENESS

A recent comprehensive three-year review of intrauterine devices by the US Food and Drug Administration has concluded that "IUDs are generally safe, effective, and a useful form of birth control" (337). This reaffirms similar USFDA findings published in 1968 (336). The 1978 report summarizes the current status of the IUD as follows:

> Currently marketed IUDs* [in the US] have a net pregnancy rate of approximately 1 to 6 per 100 women users at the end of the first year. Expulsion rates are reported to range from 4 to 18, and removals for medical reasons due to adverse side effects, 12 to 16 at the end of one year . . . .
>
> In general, morbidity and mortality rates associated with the use of IUDs remain low. In the United States the current mortality rate is estimated to be somewhere between 1 to 10 deaths per million woman-years of use. Furthermore, IUDs are believed to be associated with a higher morbidity but a lower mortality rate than oral contraceptives.
>
> While IUDs are still considered to be generally safe and effective, increased risk of spontaneous abortion, septic midtrimester abortion, and premature delivery pose potential problems in the face of a low but persistent pregnancy rate. Moreover, there is continued and growing concern about the problem of infection resulting from the use of intrauterine contraception and its possible effects on future fertility, particularly among the nulligravid (337).

As this summary suggests, the major clinical issues in IUD research and use today are both old and new. The measures of IUD performance first established in the Cooperative Statistical Program — pregnancy, expulsion, removals for pain and bleeding, and removals for other medical reasons — remain the standard criteria for IUD evaluation. (See Table 11.) In addition, problems that are rarer but generally more serious than pain, bleeding, and expulsion have emerged now that long-term and widespread use has made it possible to detect rare events. These more serious complications include a higher risk, in pregnancies with the device in situ, of an ectopic pregnancy or of a septic second trimester abortion, and possibly also a higher risk of subsequent infertility caused by pelvic infection than among women not using IUDs.

One statement can be made with certainty: no evidence of any kind has been found that IUDs cause or promote cervical or endometrial malignancy (337).

In the developing countries as in the USA mortality rates from IUD use are low. Adapting a computer model developed by the Population Council, Malcolm Potts has estimated the mortality associated with IUD use and with oral contraceptive use for women in various age groups in developed countries and in two types of developing countries (225) (see Table 12 and see also **Population Reports,** Series A, Number 5, *OCs — Update on Usage, Safety, and Side Effects*, January 1979, Table 27, p. A-171). Under the assumptions of this model, IUD-related deaths annually in developed countries range from 0.5 to 1.0 per 100,000 women aged 20 to 39 (or 5 to 10 per one million women) depending on age, whereas in advanced developing countries (LDCA) like Korea and Taiwan they are double that number and in less advanced developing countries (LDCB)

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*IUDs marketed in the US are the Lippes Loop, Saf-T-Coil, Cu-7, and Progestasert.

Table 11. One-year Event Rates for Pregnancy, Expulsion and Removals for Bleeding/Pain in Selected Multicenter IUD Studies, 1970-1979

					Rate per 100 Women		
Device	Author & Date	Ref. No.	Number of Insertions	Woman-months of Use	Pregnancy	Expulsion	Removals for Bleeding/ Pain
UNMEDICATED							
Lippes Loop C	IFRP 1979[a]	114	1,417		2.7	14.0	10.0
	Snowden et al. 1977	285	4,067		1.2	7.4	12.3
	Tietze & Lewit 1970[b]	323	3,489	31,032	3.0	19.1	11.0
Lippes Loop D	IFRP 1979[a]	114	2,502		2.9	11.1	10.0
	Snowden et al. 1977	285	2,082		1.4	5.2	10.1
	Tietze & Lewit 1970[b]	323	7,553	72,046	2.7	12.7	11.7
	WHO 1979	400	894	9,275	2.0	8.3	8.2
Saf-T-Coil	Snowden et al. 1977	285	2,737		1.4	9.3	13.9
	Tietze & Lewit 1970[b]	323	2,463	17,646	2.8	19.3	14.7
Antigon Wing	Snowden et al. 1977	285	421		1.1	9.0	11.8
Antigon Film	Snowden et al. 1977	285	406		1.2	8.8	18.3
MEDICATED							
TCu-200	Jain & Sivin 1977	122	15,662	121,320	2.6	7.7	8.6
	Snowden et al. 1977	285	1,492		0.4	5.7	7.6
	Tejuja et al. 1975	320	4,357	37,429	0.9	7.4	10.8
	Timonen & Luukkainen 1974	325	2,689	29,143	1.6	2.2	7.1
TCu-200 & TCu-220	IFRP 1979[a]	114	3,909		2.0	6.8	6.2
TCu-220C	Sivin & Stern 1979	282	1,850	15,897	0.8	7.0	12.8
	WHO 1979	400	889	9,952	0.6	4.1	5.0
TCu-300	Luukkainen et al. 1974	169	1,420	15,177	1.0	1.3	4.3
	Sivin 1979	271	9,641	67,990	2.0	7.6	9.2
TCu-380A	Sivin & Stern 1979	278	3,536	31,225	0.7	5.5	13.1
Cu-7	Gibor et al. 1972	71	8,065	83,676	1.4	5.9	8.9
	IFRP 1979[a]	114	1,439		2.0	5.1	2.7
	Jain & Sivin 1977	122	1,831	12,289	2.8	15.5	10.0
	Snowden et al. 1977	285	6,098		2.1	11.7	9.4
	Tejuja et al. 1975	320	854	5,177	2.4	6.4	10.9
Multiload-cu250	Theiry et al. 1978	321	2,782	29,669	0.5	2.2	3.7
Nova T	Luukkainen et al. 1979	167	907	8,790	0.7	5.8	12.3
Progestasert	Alza Corp. 1976	13	4,264 (parous)	35,739	1.9	3.1	9.7
			1,231 (nulliparous)	10,109	2.5	7.5	12.1

[a] IFRP data are adjusted for varying age and parity of users of different devices.
[b] Multiple segment data

Source: Adapted from Sivin (271)

they would be nearly triple that number (225). Assuming a failure rate of approximately two per hundred women annually, deaths associated with childbearing when the IUD failed to prevent pregnancy would range from 0.4 to 1.3 per 100,000 per year in Korea-type areas and from 6.6 to 9.5 in Bangladesh-type areas. In other words, there would be about 2 to 3 deaths per 100,000 for those women annually from the IUD compared with up to 9 or 10 per 100,000 from the pregnancies after IUD failure. Without contraception, however, death rates from pregnancy alone would average about 20 times higher than all the IUD and IUD-failure deaths in each type of area. When compared with oral contraceptives, IUDs are about twice as safe as orals used by young women without conditions predisposing them to circulatory disease and three to five times safer than OCs used by older women with predisposing conditions (225, 235). (See Table 12.)

Effectiveness

The IUD is one of the most effective modern methods of contraception. The latest US study of contraceptive efficacy showed an IUD failure rate of 4.2 per 100 married women aged 15 to 44 (see Table 13). In women using IUDs to prevent pregnancy, the failure rate was 2.9 percent; these women were probably in their 30s and careful in checking for expulsion. In women using IUDs to delay or space pregnancy, the failure rate was 5.6 percent (340).

In the US, IUDs are somewhat less effective than oral contraceptives and sterilization, but in developing countries where women are not accustomed to taking a pill every day, IUDs frequently have lower failure rates than orals (225). The great advantage of IUDs, of course, is that the effectiveness of the device does not depend on specific actions of the user such as taking a pill every morning or using a barrier method of contraception at each act of intercourse.

Table 13. **Effectiveness of Various Contraceptive Methods Used to Delay or to Prevent Pregnancy, United States, 1970-1973**

Contraceptive Method	First Year Pregnancies per 100 Married Women Aged 15-44		
	Used to Delay Pregnancy	Used to Prevent Pregnancy	Rates Standardized for Intent
Sterilization	0.0	0.0	0.0*
Oral Contraceptives	2.0	2.0	2.0
IUD	5.6**	2.9**	4.2
Condoms	13.7	6.6	10.1
Foam, cream, or jelly	16.7	13.1	14.9
Diaphragm	15.9	10.3	13.1
Rhythm	28.8	9.5	19.1
All other	15.1	6.5	10.8

*Tatum attributes a failure rate of about 0.4 to sterilization (312).
**Not statistically significant difference at $p < 0.01$

Source: Vaughan et al. (340)

Mode of Action

Even though the modern era of intrauterine contraception is two decades old, the precise mechanism by which IUDs prevent pregnancy remains unknown. In animals the mode of action of an IUD varies from one species to another, depending not only on anatomical variations but also on physiological differences in reproductive and endocrine systems (337). For example, in fowl and sheep, IUDs block sperm transport; in the guinea pig, cow, and pig they inhibit implantation; and in the guinea pig, rabbit, pig, cow, and ewe, they interfere with corpus luteum function (337).

Table 12. **Annual Number of Live Births, Birth-Associated Deaths, and Deaths Associated with Selected Means of Fertility Control per 100,000 Nonsterile Women, by Method of Fertility Control, Age, and Development of Country**

Method and Outcome	Age Group/Country Type											
	20-24			25-29			30-34			35-39		
	DC	LDCA	LDCB	DC	LDCA	LDCB	DC	LDCA	LDCB	DC	LDCA	LDCB
No control												
Live births	61,400	45,940	45,950	59,290	43,170	43,170	55,730	39,930	39,930	47,700	34,210	34,210
Birth-associated deaths	6.1	9.2	183.8	7.4	10.8	215.9	13.8	20.0	199.7	21.0	34.2	171.0
Oral contraceptives (without predisposing conditions)												
Live births	1,940	2,650	2,650	1,910	2,600	2,600	1,770	2,410	2,410	1,350	1,840	1,840
Birth-associated deaths	0.2	0.5	10.6	0.2	0.7	13.0	0.4	1.2	12.0	0.6	1.8	9.2
Method-associated deaths	1.2	0.8	0.8	1.2	0.8	0.8	1.9	1.3	1.3	4.0	3.0	3.0
Total deaths	1.4	1.3	11.4	1.4	1.5	13.8	2.3	2.5	13.3	4.6	4.8	12.2
Oral contraceptives (with predisposing conditions)												
Method-associated deaths	1.4	1.0	1.0	1.4	1.0	1.0	11.4	6.0	6.0	28.8	13.0	13.0
Total deaths	1.6	1.6	11.6	1.6	1.7	14.0	11.8	7.2	18.0	29.4	14.8	22.2
Intrauterine devices												
Live births	1,940	1,920	1,920	1,910	1,890	1,890	1,770	1,750	1,750	1,350	1,330	1,330
Birth-associated deaths	0.2	0.4	7.7	0.2	0.5	9.5	0.4	0.9	8.7	0.6	1.3	6.6
Method-associated deaths	0.5	1.0	1.5	0.5	1.0	1.5	0.8	1.5	2.3	1.0	2.0	2.0
Total deaths	0.7	1.4	9.2	0.7	1.5	11.0	1.2	2.4	11.0	1.6	3.3	9.6

DC = Developed Countries; LDCA = Less-developed countries type A, comparable to Taiwan and Korea; LDCB = Less-developed countries type B, comparable to Bangladesh.

Source: Adapted from Potts et al. (225)

In humans the numerous cellular and biochemical alterations induced in the endometrium by the IUD are believed to be responsible for the contraceptive effect (337). All unmedicated and copper devices stimulate an inflammatory or foreign body reaction in the uterus. After IUD insertion numerous polymorphonuclear leukocytes appear in the endometrium and uterine fluids, followed by foreign body giant cells, mononuclear cells, plasma cells, and macrophages (87, 188, 189, 250, 251). These cells may literally engulf or consume the spermatozoa or the fertilized ovum by the process of phagocytosis. This is the most widely accepted theory at the present.

Another theory, not necessarily incompatible, is that changes in the endometrium, perhaps stimulated by the inflammatory reaction, delay the normal hormonal cycle, creating an endometrium inhospitable to implantation (28, 125, 372). No evidence has emerged, however, that IUDs work by causing any fundamental changes in hormonal function or in the menstrual cycle (222).

Medicated IUDs, in addition to producing an inflammatory reaction, have local effects which may play a part in their contraceptive action. IUDs containing copper interfere with enzyme systems (208), with cellular DNA content in the endometrium (89), with glycogen metabolism (236), and with estrogen uptake by the uterine mucosa. Copper increases the inflammatory reaction (182). Copper ions in vitro are toxic to sperm, but this effect is less important than enzyme system interference (123).

IUDs containing progesterone interfere with the normal hormone-stimulated cycle of the endometrium (220, 258). By maintaining high progesterone levels and, in consequence, relatively low estrogen levels, these devices keep the endometrium in the decidual, or progestational, phase, in which implantation is unlikely (259). The small amount of progesterone released by these devices does not appear to affect ovarian function and is not detectable in blood serum (259).

INSERTION AND REMOVAL

Proper insertion of an IUD is critical to the success of the device since it can affect all the major events that determine continuation of use — pregnancy, expulsion, bleeding, pain, and removals for other medical reasons (mainly perforation and infection). In the continuing effort to expand IUD use and improve performance, three clinical issues of current concern are: the timing of insertion, the specific techniques used to assure proper IUD placement in the uterus, and the role of paramedical personnel (see also **Evaluation and Research**, pp. B-77–B-85).

Counseling

Every woman of reproductive age is entitled to accurate and understandable information about family planning methods. A woman who chooses an IUD should be told in simple terms how the device works and how it may affect her. She should know that, like every other method of contraception, the IUD is not foolproof and that there is a small chance she can become pregnant while using it. She should know that if she misses a period or is unable to locate the transcervical threads of her IUD she should return for follow-up care. She should also know the common signs of infection — fever, pelvic pain or tenderness, unusually severe cramping, or unusual bleeding —and be urged to seek help from health care personnel if signs should appear. A woman using a medicated IUD should know when the device is supposed to be replaced. She should be warned against any attempt to remove the IUD herself (100).

The common side effects of IUD use also should be carefully explained. As the Pathfinder Fund points out:

> It is a mistake to belittle potential side effects of an IUD in an attempt to have the woman become an IUD acceptor. In that case, she will probably be surprised and afraid if bleeding or pain should occur, and will want to have the IUD removed immediately. This will give IUDs a poor reputation in the community, and will be detrimental to the family planning program (222).

It is also important for the health care provider to dispel any false rumors about IUDs, for example, that IUDs cause cancer or that a baby conceived with an IUD in place will be deformed. These rumors have been demonstrated false. Anyone who chooses an IUD should also know that if she is ever dissatisfied with the device for any reason, it can be removed (222). Above all, she must know that she can return to a health care center or provider for answers to any questions she may have or help with any problems that may arise.

Timing of Insertion

What is the most appropriate time for IUD insertion? The conventional answer, first provided by Gräfenberg in 1931, is that IUDs should only be inserted immediately after menses (75). As Gräfenberg pointed out, this assures that the woman is not pregnant. Insertion during or immediately after menstruation has other advantages: the cervical os is dilated, the endocervical canal is soft, and any bleeding produced by insertion is masked by normal menstrual bleeding (336, 337).

Many clinics are still following this advice. In a 1976 survey undertaken by IPPF and the US Center for Disease Control, one-third of the 240 respondents limited IUD insertion to the time of menstruation or five days after, regardless of the patient's report of sexual activity or use of other contraceptives (364). For every day beyond menstruation the respondents were less likely to insert an IUD, fearing insertion into a pregnant uterus. In areas where abortion was illegal or not readily available, insertion was even more likely to be limited to menses on the assumption that some women would conceal their pregnancies and deliberately request IUDs in hopes of causing abortion. Nearly half of the African and the Middle Eastern respondents limited insertion to the menstrual period as compared with 13 percent of Asian and 30 percent of European and American respondents. The IPPF report comments:

> The implication of these data is that many women do not have an IUD inserted when they first request it. Women who have traveled long distances to the clinic, have taken time away from their jobs, or who have made special arrangements for the care of their children, are considerably inconvenienced by having to return to the clinic at a later time for insertion of an IUD and may be discouraged from ever obtaining one (364).

The latest research findings show that, from the point of view of safety and effectiveness, some of these precautions are no longer necessary and more attention can be paid to the convenience of the potential user. In the last decade investigators have found that IUDs can be successfully inserted after delivery, both in the early and later postpartum period, and immediately after abortion as well as later during the menstrual cycle. In its 1978 report, the US Food and Drug Administration still recommends insertion of IUDs during the menstrual period, but acknowledges that this is not always possible and that it may be "necessary and proper" to insert an IUD at other times (337). Likewise, the World Health Organization has noted that limiting IUD insertion to the menstrual period may not be a practical approach in large-scale family planning programs (367).

For a woman who has neither delivered nor had an induced abortion and who is reasonably sure that she is not pregnant and does not want to become pregnant, the best time to insert an IUD is probably the time she appears in the clinic or health center to request it, regardless of the timing of her menstrual cycle. A study by the US Center for Disease Control investigated event rates for 9,094 women using TCu-200 devices in the first two months after insertion, when those events would be most likely to be influenced by the insertion itself. Rates of both expulsion and pelvic infection were lower the later in the menstrual cycle that the IUDs were inserted; in fact, IUDs inserted during the first five days of the menstrual cycle were twice as likely to be expelled or to produce pelvic infection as IUDs inserted after the seventeenth day. Pregnancy rates and removal rates for bleeding and pain were slightly higher for insertions late in the cycle while rates for medical removal were lowest in midcycle (363). The authors conclude "there is no justification for a blanket policy of inserting IUDs only during the menses" (363).

Postcoital Insertion

While the normal and recommended practice is to seek assurance that a woman is not pregnant at the time of insertion, IUDs have been deliberately inserted, on an experimental basis, immediately after unprotected intercourse when a woman might become pregnant so as to prevent or interrupt a fertilized ovum from implanting in the uterus. Lippes reports that no pregnancies followed insertion of a copper T in 97 young women up to five days after intercourse even though, as he estimated, the risk of pregnancy among the group would otherwise have been about 10 to 20 percent (162). In Holland, A.A. Haspels has recently completed a study of 60 postcoital insertions of the Multiload-cu250 in which no pregnancies resulted (96). This procedure is still experimental and has not been widely reported, but there is no record of morbidity occurring as a result to date (337). Experts suspect that the sooner after intercourse a device is inserted, the more likely it is to be effective (14).

Postpartum and Postabortal Insertion

With regard to postpartum insertions, a comprehensive review of international experience by Rosenfield and Castadot showed that complications were not substantially higher for early postpartum insertions (those performed before hospital discharge) than for those performed after six weeks or unrelated to pregnancy (240). With respect to perforations, for example (excluding one center with an exceptionally high rate), IUDs inserted 48 hours or less following delivery in the International Postpartum Program of the Population Council produced a much lower incidence of perforation (0.2 percent) than IUDs inserted between the fourth and eighth weeks (1.8 percent) or after the eighth week (0.4 percent) (240). With respect to bleeding, no significant differences in removal rates (20) or hemoglobin levels (110) were noted between women receiving IUDs immediately postpartum and those with later insertions or no IUDs, respectively. With regard to pain and infection, incidence was slightly lower among women with early rather than later postpartum insertions (20).

Only with respect to expulsion rates was the rate for early insertions (11.5 percent at one year) about double the rate for postdischarge insertions in the International Postpartum Program (272). Since early postpartum expulsions are followed by a high proportion of reinsertions (65 to 95 percent) and since expulsion rates have declined with increasing clinical experience, this concern has somewhat eased (20, 50, 77, 323). Moreover, research is now underway to develop postpartum IUDs that will resist expulsion and postpartum inserters that will minimize perforation and misplacement (see p. B-83). Overall, continuation rates after one year were slightly higher for women returning later for an IUD (79 per hundred women) than for the immediate acceptors (74), but after four years an estimated 42 percent of the immediate postpartum acceptors were still using IUDs (272).

There are obvious advantages in providing an IUD immediately after delivery for the woman who wants this protection rather than insisting that she make a return visit which may be difficult for her. Gonzalo Echeverry showed that 95 percent of postpartum women requesting an IUD before discharge received the IUD then. On the other hand, only 45 percent of those prospective IUD acceptors who were told to come back for an IUD in six weeks actually returned (50).

IUD insertion immediately after abortion is also proving a safe and effective way to meet contraceptive needs. Although at first doctors feared higher rates of infection and perforation if IUDs were inserted immediately after abortion — and the USFDA still does not recommend IUD insertion either postpartum or postabortion until uterine involution is complete (333) —these fears have not been confirmed in practice. Studies in Chile, Finland, India, Korea, Poland, Sweden, the United States, Yugoslavia and by WHO reveal no serious problems with respect to infection, perforation, expulsion, bleeding, or other events following postabortal insertions (16, 74, 110, 142, 205, 221, 241, 272, 310, 325, 345, 400). Studies have included induced and spontaneous abortions, with and without infection, dilatation and curettage as well as vacuum aspiration, and a variety of different devices, all with similar results. An important benefit of postabortion insertion is to provide effective contraception immediately at a time of proven fertility and high motivation and thus to reduce the likelihood of repeated abortions.

Insertion Technique

Proper insertion and placement of the device are important to reduce the risk of perforation, expulsion, accidental pregnancy, bleeding and pain, infection, and other medical problems. As indicated in the **Guidelines for Use of IUDs** (see pp. B-74–B-75), the objective is to place the device as high as possible in the endometrial cavity without perforating the myometrium. If the device is not placed high in the uterine fundus, the contractions of the lower uterus can more easily expel it. Moreover, most pregnancies occur in the upper portion of the uterus and unless the device covers that area, it will not provide effective protection.

Insertion techniques vary somewhat with different devices and in each case the manufacturer's instructions should be followed precisely. In general, because most IUDs are passed through the cervix within a tube-like inserter and released in the uterus, the narrower the diameter of the inserter, the easier the insertion process. Most devices introduced recently have specially designed inserters, which, including the loaded device, vary in width from about 0.3 to 2.5 cm. The Progestasert inserter, for example, an improved design, consists of a single curved tube without a plunger. The horizontal arms of the T are positioned outside the inserter and folded back with an arm-cocker attachment just before insertion. The inserter can be manipulated with one hand, leaving the other free to control the tenaculum. Since this design was introduced, its developer, the Alza Corporation, has received no reports of uterine perforations (217).

For other devices, there are two basic methods of insertion, a "push-out" technique and a "withdrawal" technique. In the "push-out" procedure, used for the Lippes Loop and Saf-T-Coil, the tube containing the IUD is inserted just beyond the internal os and the plunger moved forward until the IUD is pushed out of the inserter. Then plunger and tube are withdrawn together. In the "withdrawal" method, used for the copper 7 and copper T, the tube with the IUD is inserted up to the uterine fundus. The outer tube is then withdrawn while the inner rod maintains the IUD in proper position. Finally the rod is withdrawn. The Ts and 7s are generally thought to be easier to insert than the Lippes Loops (240). (See Figure 2.)

Use of Paramedical Personnel

Considerable attention is now being given not only to the design of inserters and measuring devices to assure better placement of the device (see p. B-83) but also to the training required for IUD insertion. Expulsion rates decline as the skill and experience of the person performing the insertion increases (25, 76, 77, 240, 374), but evidence from many countries suggests that properly trained paramedical personnel can insert IUDs as well as medical doctors.

As Table 14 indicates, nurses and midwives performed as well as physicians on the average, and in the largest study, in Thailand, the expulsion rate was substantially lower after insertions by nurse-midwives (370). Adequate training is necessary for all health personnel doing IUD insertions. (For a listing of training courses for nonphysicians, see **Population Reports,** Series J, Number 6, *Training Nonphysicians in Family Planning Services and a Directory of Training Programs*, September 1975.)

To promote IUD use, some countries have specifically authorized IUD insertions by paramedical personnel. In the Philippines, for example, a 1972 Presidential Decree called for training courses for nurses on IUD insertion as well as on oral contraceptive distribution (34). Other countries that have legalized and encouraged IUD insertion by nonphysicians include China, Thailand, Pakistan, Iran, Afghanistan, Ghana, Zaire, Ecuador, and Chile (117, 165, 213, 230, 238, 239, 370, 375).

Removal

The removal of an IUD may be necessary either for medical or for personal considerations. Medical indications and guidelines for removal are listed on p. B-75. Nonmedical indications include a desire by the woman to initiate a pregnancy or to try another form of contraception. Medicated IUDs should be re-

Figure 2. IUD inserters pictured above are, from top to bottom, for the Lippes Loop, standard commercial model utilizing a push-out technique; the TCu-200, utilizing a withdrawal technique; and the Progestasert, utilizing an automatic loading and modified withdrawal technique that can be performed with one hand.

Table 14. One-year Event Rates per 100 Women, by Type of Personnel Performing Insertions, Selected Studies, 1976-1979

Author & Date, IUD Type, and Personnel	Ref. No.	Country	Number of Insertions	Event				
						Removal		
				Pregnancy	Expulsion	Medical	Personal	Continuation
Einhorn & Trias[a] 1978	52	Colombia						
Nurses				2.0		8.0		
Physicians				2.0		6.0		
Loghmani & Mitra 1976	165	Iran						
TCu-200								
Midwives			252	4.1	13.8	13.5	2.6	66.3[b]
Physicians			646	2.3	10.1	12.8	1.5	73.7[b]
Pastene et al. 1977	213	Chile						
Lippes Loop D								
Nurses			296	9.3	7.0	1.1	0.0	86.2
Physicians			399	2.2	12.4	3.6	2.7	79.1
Cu-7								
Nurses			174	3.2	8.1	2.5	3.3	82.8
Physicians			340	3.1	2.5	3.1	2.2	89.1
TCu								
Nurses			313	2.3	4.3	4.6	5.5	83.3
Physicians			470	2.2	2.7	6.7	3.1	85.2
Ramos & Apelo 1979	230	Philippines						
Lippes Loop C and D								
Nurses and midwives			162	1.4	19.5	0.6	4.4	74.1
Physicians			188	2.1	13.9	0.7	3.0	80.3
Wright et al. 1977	370	Thailand						
TCu-200								
Nurse-midwives			971	0.9	2.9	6.4	3.0	86.8
Physicians			1,996	1.0	6.7	5.2	5.2	81.9
Zieghami et al. 1976	375	Iran						
Lippes Loop C and D								
Midwives			232	0.5	5.0[c]	17.6	1.7	75.2
Clinic personnel			232	1.9	3.6[c]	14.7	5.2	74.6

[a] Data for six months' use only

[b] Difference is statistically significant ($p<0.05$).

[c] Without reinsertion

moved and replaced periodically if the patient wishes to be sure of effectiveness levels. Unmedicated devices that are performing satisfactorily do not require replacement.

Confronted by difficult removal cases, such as those where the IUD is in the uterus but the strings are not visible, the clinician has several options before resorting to special diagnostic techniques, such as x-rays or sonographs (337). Simple hooks have been successful in probing the uterine cavity and locating and removing IUDs with no other diagnostic measures (397). Hysteroscopy permits direct observation of the uterine cavity and should permit more precise extraction (270). John Guillebaud of Great Britain reports the successful use of a 4 mm Rocket disposable vacuum aspiration curette to retrieve the threads of 35 out of 36 IUDs that were left in uteri with threads not visible (387, 388). The use of x-rays for diagnosis and laparotomy for surgical removal of the IUD should be the last recourse (387, 388). These measures should be used only if the woman is not pregnant, of course.

EXPULSION

IUD expulsion rates in most large studies range from about 5 to 20 per 100 women at one year (see Table 11). They are influenced by the age and parity of the user, the timing of insertion, the interval after insertion, the skill of the person performing the insertion, and the size and nature of the device. About 20 percent of IUD expulsions go unnoticed (323), and approximately one-third of pregnancies among IUD users occur after unnoticed expulsion (178).

Like pregnancy rates, IUD expulsion rates decline with the age of the user; among multiparous women they are about twice as high under age 30 as over (114). Parity also affects expulsion rates (25). Nulliparous women, with small uteri, do not tolerate the larger devices and in fact have higher expulsion rates with all devices (26). Differences in expulsion rates by parity among women who have given birth are much less than the differences between parous and nulliparous women.

Expulsion rates also depend on the skill and experience of the individual performing the insertion. One center in Finland, for example, reports one-year expulsion rates of only one or two per 100 (169,326).

As noted earlier, expulsion is related to the timing of insertion and occurs more frequently after insertions four to eight weeks postpartum or insertions in the first 17 days after the menstrual period (323,363). Expulsion is even more closely related to the period of time after insertion. The highest incidence is in the first three months of use (323); after three years, Lippes reports, no expulsions at all occurred among his patients (163) (see Figure 1). Expulsion takes place most frequently during menstruation, especially the first menstrual period after insertion, when the uterus contracts, exerting a downward force (98, 99).

Different expulsion rates have been observed with different devices. Generally, the expulsion rate is higher with smaller devices than with larger ones of the same design (323). The T- and 7-shaped devices, on the other hand, although smaller in surface area, have lower expulsion rates than the Lippes Loop — about 6 per 100 women at one year compared with about 11 for the Loop (see Table 11). Expulsion rates — and other event rates as well — may be correlated with the fit of the device in the uterus (see Figure 3). Any disorientation of the device within the uterus or a dimensional disproportion between the device and the uterine cavity provokes uterine irritation and myometrial contraction (133). Research is now underway to identify better ways to match the size and shape of IUDs to the size and shape of the uteri of potential users (99) (see pp. B-82–B-83).

From a clinical point of view, expulsion is not a serious problem if it is discovered promptly and if the woman has access to a clinic or other health services. Usually another device can be inserted and retained. In the CSP, two of every three women experiencing a first expulsion had a second IUD inserted, and almost one-half of these retained a Loop for at least six years after reinsertion (323).

Complete expulsion of an IUD exposes the user to the risk of unwanted pregnancy. With incomplete expulsion, the device may become lodged in the lower uterine cavity or the cervical canal, reducing contraceptive protection (352). The IUD user should be aware of both possibilities. She should be showed how to check for the strings of the device after each menstrual period. She should be advised to seek help if the device appears to be out of its normal position or missing and to refrain from intercourse or use another form of contraception until a new IUD can be inserted.

PERFORATION AND EMBEDDING

The use of an IUD carries with it the risk that the device may perforate the uterine wall, migrate into the peritoneal cavity or become lodged in the musculature of the cervix. While relatively rare, these conditions are sometimes difficult to diagnose and can lead to serious consequences for the IUD user. Opinions are divided as to proper clinical management.

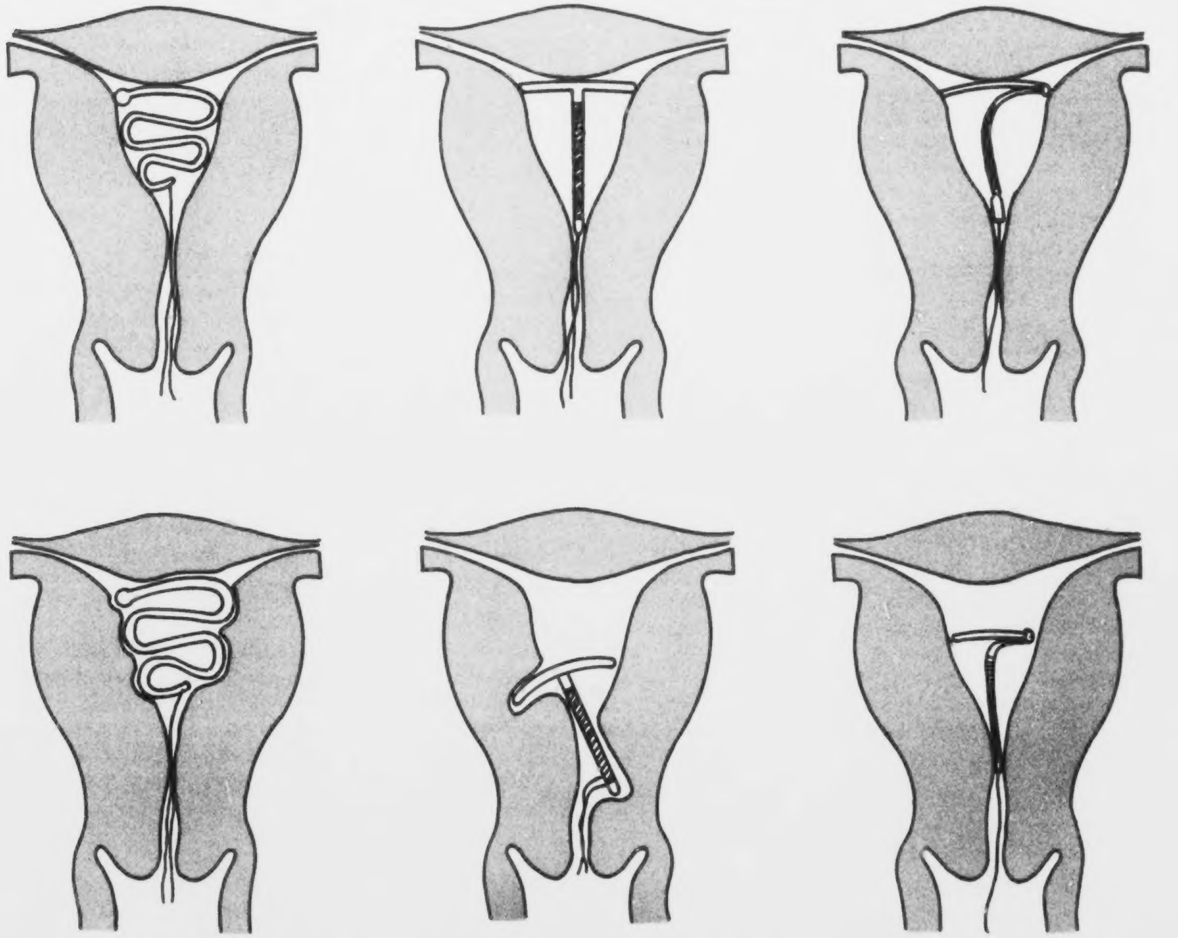

Figure 3. In the top row, left to right, a Lippes Loop, TCu-200, and Cu-7 device are shown in proper position high in the uterine fundus; in the bottom row are shown a Loop that is too large for the uterus and is pressing into and irritating the endometrium, a TCu-200 that is perforating the cervix, and a Cu-7 that is too small for the uterus and has slipped or been forced out of position by uterine contractions. IUDs in the bottom row would be likely to produce higher rates of pregnancy, expulsion, and removal for bleeding/pain.

Tatum identifies four variables that influence the risk of fundal perforation: the size, shape, and consistency of the device; the status and configuration of the uterus; the insertion technique; and the skill and experience of the operator (308). The last is crucial. As Lippes observes, "IUDs do not perforate. For this to happen we need a practitioner" (159).

The incidence of fundal perforations is difficult to establish because they often take place without bleeding or pain and so remain undetected. The Cooperative Statistical Program estimated the incidence of perforation at less than 1.2 per 1,000 insertions (323), but one center reported initial perforation rates as high as 8.7 per 1,000 insertions (323). Most perforations begin or occur at the time of insertion (286); possibly all do. Of the two basic insertion techniques, withdrawal and push-out, the push-out method is more likely to result in perforation (240, 308, 337).

While fundal perforations are usually the result of improper insertion, cervical perforations are the result of downward displacement of a device in response to uterine contractions (97). (See Figure 3.) This can occur with any device with a vertical arm such as the T or 7 devices. The incidence of cervical perforation is not known because it is almost always asymptomatic (309). In order to minimize this type of perforation the Population Council added a plastic ball to the tip of the T's stem (309). If cervical perforation is discovered the IUD should be removed. This may be done by grasping the vertical arm of the device with forceps and applying upward pressure to dislodge the tip of the device. The device can then be removed in a conventional manner (97).

Diagnosis of fundal perforation by an IUD is sometimes difficult, especially if radiologic or sounding procedures are not available. The condition should be suspected if pregnancy occurs, if the tail of the device is not visible, or if the user experienced sharp pain at the time of insertion (308). Diagnosis can be made by hysterography or hysteroscopy or by placing a sound in the uterine cavity and obtaining lateral and anteroposterior x-rays of the pelvis (176). In place of a sound, some clinicians insert a second IUD of a different type as a uterine marker. When the appropriate equipment is available, ultrasound offers a noninvasive and effective means of locating "lost" IUDs without exposing the patient to x-radiation (279).

Some controversy exists over the management of extrauterine IUDs, specifically of inert devices, such as the Lippes Loop and Saf-T-Coil. On the one hand, Richard Soderstrom, based on experience at the Mason Clinic in Seattle (USA), recommends that all intraabdominal IUDs, symptomatic or asymptomatic, be removed (287). He speculates that some of the bacteria introduced during insertion may survive in an "inflammatory cocoon" and could cause infection if there were a change in host resistance (287). The USFDA report notes that any intraperitoneal device has the potential to cause inflammation or intestinal obstruction (337). On the other hand, Lippes recommends that these devices be allowed to remain in the peritoneal cavity as long as the user is asymptomatic on the grounds that the risks of surgery and postoperative complications are greater than the risks involved in leaving the IUD in place (159). He points out that at least two deaths have been reported in the US as a result of surgery to remove an asymptomatic device (130) but that there are no reports of deaths caused by linear devices remaining in the peritoneal cavity after perforation (159).*

There is no controversy over the management of closed types of IUD or those containing copper; they should be removed as soon as possible. Closed devices, such as the ring or bow, can cause bowel strangulation while copper devices elicit an intense tissue reaction leading to the formation of omental adhesions (309).

Hazards involved in perforation by a progesterone-bearing IUD have not yet been assessed. The speculation is that there would not be the same reaction as with copper since progesterone is a rapidly absorbed, naturally occurring hormone (337).

Removal of IUDs that have perforated the uterine cavity can often be accomplished by laparoscopy, although laparotomy may sometimes be required. Some investigators have reported success in locating and extracting perforating IUDs by hysteroscopy when the device is partly in the uterine cavity (270).

BLEEDING AND PAIN

The most frequent problem for IUD users is increased bleeding, often accompanied by cramplike discomfort or lower back pain. This increased bleeding takes the form of

- greater volume of flow during menstrual periods (for all but progestin-releasing IUDs)
- prolonged duration of menstrual periods
- more frequent spotting between menstrual periods.

These conditions constitute a personal inconvenience to many users, a social problem in certain cultural settings, and a potential cause of anemia. The programmatic result is that about 5 to 15 percent of all IUD users have the device removed because of bleeding and pain within the first 12 months (see Table 11).

Volume of Flow

It has been recognized for some time that most IUDs increase the volume of blood flow during menstrual periods. More than a dozen studies in at least six countries — Denmark (88), Egypt (102, 107), Mexico (69), Sweden (143, 157, 171, 245, 246, 357), the United Kingdom (82, 83, 84, 186), and the United States (116, 149) — have documented this fact.* (See Figure 4.) Normal menstrual blood loss by healthy women averages about 35 ml (94, 116, 357). With unmedicated devices such as Lippes Loop C or D, Dalkon Shield, Saf-T-Coil, or Birnberg Bow, menstrual blood loss measured at various intervals after insertion is approximately doubled from normal or preinsertion levels with average increases ranging from about 20 to 50 ml (69, 83, 84, 88, 105, 107, 116).

Blood loss can also be evaluated by comparing the percentages of women who experience excessive bleeding before and after IUD insertion. Menorrhagia (usually defined as blood loss exceeding 80 ml) occurred in 48 percent of Danish women after IUD insertion (88) and 51 percent of UK women after IUD insertion as compared with 14 percent of the UK women before insertion (84). Incidence of menorrhagic periods among Swedish women (defined in this study as periods with blood loss exceeding 60 ml) was 46 percent for women with the

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*Note: Menstrual blood loss in these studies is determined by the Hallberg-Nilsson method (95) in which all pads and tampons are collected and soaked in a 5 percent sodium hydroxide solution, thus permitting recovery of alkaline hematine which is then determined spectrophotometrically.

***Editor's Note:** Readers are invited to submit for further evaluation case reports of mortality resulting either from an extrauterine linear device left in place or from surgery to remove an extrauterine linear device.

Lippes Loop compared with 15 percent for women without IUDs (357). (Based on the experience of Swedish women, Göran Rybo estimated that an average increase in blood loss of 31 ml would mean a 15 percent increase in the number of women with menorrhagia or mean blood loss exceeding 80 ml; an increase of 41 ml would mean a 25 percent increase in women with menorrhagia) (245).

With copper 7 and copper T devices, menstrual bleeding is also increased, but by a smaller amount. Most studies show postinsertion increases of 10 to 30 ml or about 50 percent (84, 107, 116, 143, 156, 157, 171). In a British study the percentage of women using the Cu-7 who experienced menorrhagia was about 25 percent, compared with 50 to 60 percent for women using the Lippes Loop and 10 to 15 percent for the entire group before insertion (84, 186). In Sweden, 24 percent experienced menorrhagia after insertion of a copper 7, compared with 14 percent before insertion (171).

The smaller increase in bleeding with copper devices as compared with the Lippes Loop seems to be caused by the smaller surface area of the device rather than the addition of copper; adding copper to the Lippes Loop in one study produced even more bleeding during the first six cycles (107).

In general, studies with both unmedicated and medicated devices suggest that the amount of menstrual bleeding in individual women with IUDs does not change greatly over time even though a woman's subjective impression as she becomes accustomed to the new pattern may eventually be of a decline (88, 245). Evidence also suggests that women who report heavier than normal menstrual bleeding before IUD insertion experience a smaller increase in bleeding after IUD insertion and even in some cases a decrease (143). This suggests that heavy bleeding should not be automatically regarded as a contraindication to IUD use (143).

Unlike the unmedicated or copper IUDs, progestogen-releasing devices reduce the volume of menstrual bleeding below preinsertion levels and this reduction may continue gradually over several months. Studies in the UK, Finland, US, and Sweden suggest a reduction in mean blood loss of 40 to 50 percent among women using progestogen-releasing devices compared with preinsertion levels (80, 168, 246, 373). This reduction is comparable to that produced by steroidal oral contraceptives (102). Fouad Hefnawi's study in Egypt of a progesterone-releasing U-coil showed total monthly menstrual bleeding reduced to less than 5 ml after three months (107). Carl Nilsson and Tapani Luukkainen in Finland found bleeding with a norgestrel-releasing T reduced by about 40 percent (193, 196). Dysmenorrhea, or painful menstruation, has been reduced by about one-third with progestin-releasing devices, according to Swedish and US reports (349, 373).

Duration and Timing of Flow

In addition to changes in volume of menstrual blood flow, the duration of menstrual bleeding is often prolonged by an IUD in situ. In a study of 518 Canadian women, Lise Fortier found that approximately 70 percent had longer menstrual bleeding periods with Loops and copper Ts than previously (64). Roland Malmqvist noted that periods were prolonged by about half a day in 32 of 82 women (39 percent) using copper 7s (171). In a 1978 study of 281 English women, Guillebaud found menstrual periods lasted about a day and a half longer for the copper 7 users, and three-fourths of a day longer for Lippes Loop users (83). In a similar study, he found menstrual periods prolonged for three or four days in 25 women using the Progestasert (80). Often this prolonged bleeding takes the form of spotting (defined as bleeding too light to require the use of protective pads or tampons) (349, 373).

A third menstrual irregularity associated with IUDs is an increase in intermenstrual bleeding, also called breakthrough bleeding or midcycle bleeding. While there is some controversy over accurate measurement of bleeding intervals and of cyclical patterns, especially if they are disrupted by various contraceptive methods (174, 237, 284), breakthrough bleeding has been noted with all IUDs but is somewhat more frequent with progesterone-releasing devices (243, 337). About 40 percent of Canadian women, for example, reported intermenstrual

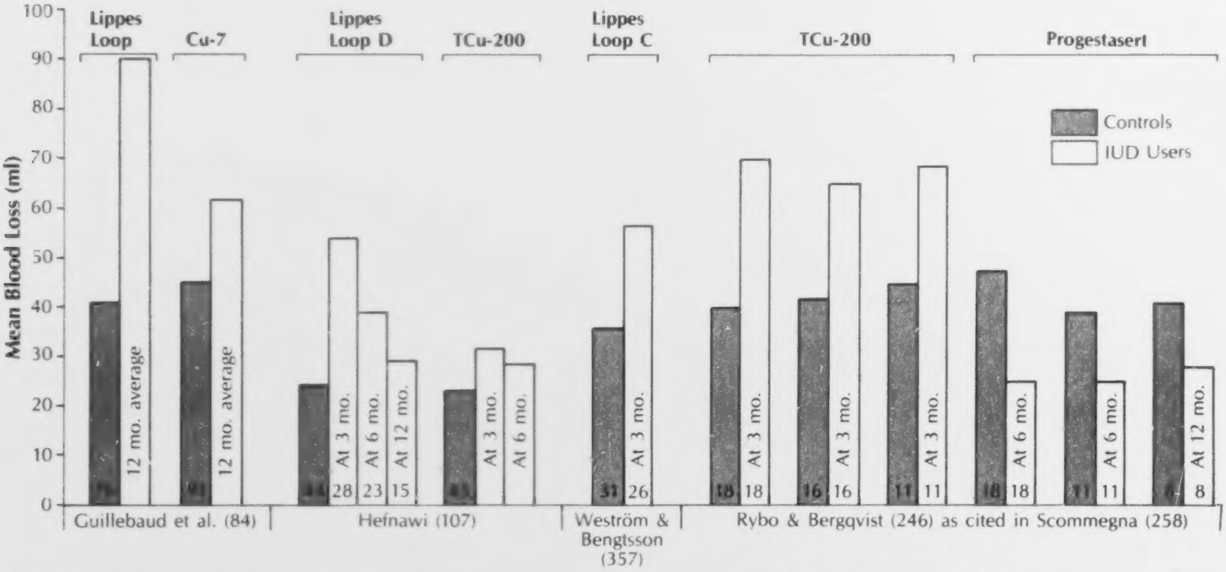

Figure 4. Mean menstrual blood loss at 3-, 6-, and 12-month intervals in parous women after IUD insertion as compared with preinsertion controls, adapted from selected studies. Numbers at the base of each bar represent the number of women in each group.

spotting and/or bleeding with the Lippes Loop and 25 to 32 percent, with copper devices (64). This compares with about 50 percent of multiparous Progestasert users in data gathered by the Alza Corporation (13). Unlike regular menstrual bleeding, the amount of midcycle blood loss attributable to IUDs is usually small (less than 10 ml) and declines with time elapsed after insertion (218, 245).

Effects of Heavy Bleeding

From a woman's point of view, any irregularities in menstruation, and especially increased bleeding, represent a source of personal inconvenience that should not be underestimated. In rural areas of developing countries where modern sanitary napkins and tampons are not available, heavy bleeding is difficult to manage. In countries where menstruating women are not permitted to prepare certain foods, carry on their usual household tasks, perform religious rites, or engage in sexual intercourse, any prolongation of bleeding or midcycle spotting can disrupt personal and household routines (362). As a result, not only the IUD user but also her husband or mother-in-law may insist on removal of the device.

From a medical point of view, the most serious effect of increased menstrual bleeding is the increased danger of anemia. Several studies of well-nourished women in developed countries, where about 5 to 25 percent of women of reproductive age may be anemic (88, 94, 245), have shown that plasma ferritin (82) and hemoglobin levels decline after IUD insertion (82, 83, 116, 186, 245), although others have shown no effect (143, 156). In two studies — one Danish, one US — the incidence of anemia (defined as hemoglobin levels < 12g/100 ml) increased fivefold among women whose mean blood loss after IUD insertion exceeded 80 ml (88) or (in the US study) 60 ml (116). Insertion of a progestogen-releasing device, however, which reduced menstrual bleeding, produced a rise in hemoglobin after insertion (193).

In developing countries at least half the women of reproductive age are likely to be anemic (105), their condition often aggravated by poor nutrition, parasitic disease, and frequent pregnancy and lactation. A Mexican study of hemoglobin levels in 78 women six months after IUD insertion showed declines in hemoglobin in all the women with inert or copper devices but much less or no decline in women using several progesterone-releasing devices (69). In India, however, no significant difference in mean hemoglobin level was observed between 105 women with Lippes Loops inserted postpartum and 105 postpartum women not using IUDs, all of whom were given iron supplements (110). Nonetheless, for some women in developing countries the continuing effects of heavy blood loss from IUD use could constitute a serious health problem.

Cramplike pain is also experienced by some IUD users. Usually manifested as discomfort in the uterus, lower abdomen, or back, it may be caused by uterine contractions that are intensified in an attempt to expel the foreign body (384). Contractions are usually greatest immediately following IUD insertion and may be exacerbated by menstruation.

From a programmatic point of view, bleeding and pain account for about 4 to 15 removals per 100 women after one year, or about twice as many removals as other medical causes (see Figures 1 and 6). Although the copper devices usually produce a much smaller increase in menstrual blood loss than the Lippes Loop, bleeding/pain removal rates for the copper devices in the largest studies are only slightly lower than the comparable 12-month removal rates for the Loop — 8 or 9 per 100 women with copper as compared with 10 or 11 with the Loop. In most studies, bleeding and pain are classified together. In the Tietze collaborative studies an equal number of removals were attributed to bleeding alone and to bleeding and pain together (about 1,300). Pain alone accounted for 620 of 3,266 removals for bleeding and pain during the first and second years of use (323). IUDs removed because of bleeding and pain are rarely reinserted (323).

The cause of increased menstrual bleeding is not precisely established, but it is believed that enzymes which break down proteins and activate the dissolution of blood clots (plasminogen activators) become concentrated in the endometrial tissue adjacent to the device (143, 144, 145, 157, 245, 310). These enzymes cause increased fibrinolytic activity, that is, splitting up of the fibrin which forms the essential portion of blood clots. A greater volume of blood flow is thus produced. It is also suspected that the onset of menstrual bleeding in IUD users is premature, taking place about two days early, before the end of the luteal phase. At this time plasma levels of progesterone are higher than normal for the onset of menstruation. This hormonal asynchronization may account for both the longer duration and the increased volume of menstrual flow (29, 172, 205). Intermenstrual bleeding with unmedicated and copper devices, on the other hand, is thought to be primarily due to mechanical damage to the endometrium which heals over time (245).

Clinical management of menorrhagia is not entirely satisfactory even though many different methods of therapy have been tried, including hormones, vitamins, coagulants, antifibrinolytic agents, prostaglandin synthetase inhibitors, antihistamines, and vasoconstrictors (35, 111, 337). There have been few reported efforts to evaluate the use of oral iron supplements or antibleeding therapy for IUD users in family planning programs in developing areas (110). Research is underway, however, to develop IUDs that will release antifibrinolytic and other agents directly into the uterus (see p. B-82).

In Sweden, Britain, and the US, studies have shown that the two synthetic amino acids epsilon aminocaproic acid (EACA) and the newer tranexamic acid (AMCA), both of which are potent inhibitors of the activation of plasminogen to plasma, are effective orally in reducing menstrual bleeding (31, 197, 199). Bleeding after treatment with EACA and AMCA was comparable to that experienced by women using oral contraceptives, that is, about 50 percent lower than before, and some of the same side effects — nausea, dizziness, and headache — occurred; duration of bleeding was not altered. AMCA produced fewer reported side effects than EACA (197). Oral administration of EACA (141, 170) and AMCA (357) specifically to control bleeding after IUD insertion has proved effective. In one study, AMCA limited the increase in menstrual blood loss to 11.5 percent (357). In the large doses required to limit menorrhagia, however, side effects are frequent (31).

Mefenamic acid, an inhibitor of prostaglandin synthetase, is also being tested (15, 81). In 25 IUD users both with and without menorrhagia, mefenamic acid capsules (250 mg) produced about a 20 percent reduction in bleeding as compared with pre- and posttreatment periods (81).

Although it seems to be effective, additional oral therapy in conjunction with the IUD may not offer great advantages compared, for example, with oral contraceptives. Further, it may, over a long period of time, raise some of the same systemic problems of side effects and of blood clotting that orals do. At present these therapies have not been studied or endorsed by the US Food and Drug Administration (337). Research is underway throughout the world to find an adequate solution to bleeding problems caused by IUDs.

INFECTION

Recent studies have shown that IUD users run a higher risk of pelvic inflammatory disease (PID) than nonusers. The risk is higher not only immediately after insertion, but also for as long as the device remains in place. Among IUD users, young nulliparous women may face a greater risk of PID than older women or multiparous women. PID takes a variety of forms, including gonorrhea, tubo-ovarian abscesses, endometritis, salpingitis, and actinomycosis, many of which have the potential to produce subsequent sterility, but in many cases PID is mild, asymptomatic, and heals without treatment.

Quantifying the relationship between IUD use and PID is difficult for two reasons: imprecise criteria for diagnosis of the disease and lack of a standard reference group for comparison (160, 337). Pelvic inflammatory disease consists of several conditions; diagnostic criteria differ among practitioners. Among the symptoms are fever, tenderness in the lower abdomen, tenderness upon cervical manipulation, adnexal tenderness, and sometimes vaginal discharge. Recently, however, the increased use of laparoscopy and the growing number of women seeking sterilization have provided a better opportunity for clinicians in both developed and developing countries to observe the condition of tubes and other reproductive organs and to assess the frequency of infection among former IUD users and users of other methods (40, 216, 280, 307). Still, it is difficult to estimate accurately the relative risk of PID faced by IUD users when the precise incidence of PID in the general population is not known (307). In some studies, users of oral contraceptives comprise a large proportion of the comparison group, and oral contraceptives appear to reduce the risk of PID, as do barrier methods (40, 56, 358).

It was fear of pelvic infections that led physicians in the 1920s and 1930s to be skeptical of IUDs. Tietze's collaborative studies allayed fears of serious infection — especially when women with acute PID were screened out — but the data documented a rate of 7.7 infections per 100 woman-years during the first 15 days after insertion compared with 2.2 infections per 100 woman-years 13 to 24 months later (323). About one-third of the removals attributed to "other medical reasons" (that is, other than bleeding and pain) were cases of PID. These represent only about half the cases that occurred.

Today, concern over PID is on the rise again. New clinical data suggest that it is about four times more common in IUD users than in nonusers (56, 59, 207, 307) and that it may occur as much as two years or more after insertion. In many cases the infection may be low-grade and asymptomatic, but it poses a long-term danger of tubal infection leading to sterility and of a sudden flareup complicating spontaneous abortion (see pp. B-69, B-77).

Recent studies of IUD use and PID in Sweden and the US show relative risks ranging from 1.7 to 9.3 for IUD users compared with nonusers (see Table 15). For example, in a case-comparison study of 515 Swedish women with acute salpingitis, Lars Weström and colleagues concluded that nulliparous IUD users were seven times as likely to develop PID as nulliparous nonusers (358). Multiparous IUD users, on the other hand, were only 1.7 times as likely to develop PID as multiparous nonusers. Standardized for age and parity, the relative risk among all IUD users was 2.9 (see Table 15) (207, 358). In the US, David Eschenbach and colleagues showed the risk was 4.4 times higher in IUD users than in nonusers ($p < 0.001$) (56). Among previously pregnant women the relative risk was 3.4; 33 percent of the cases were IUD users compared with 15 percent of controls. In contrast, among never pregnant women, 18 percent of the cases were IUD users as compared with 2 percent of controls. This reinforces Weström's conclusion that the risk of IUD-related PID is greater for nulliparous women. Also, for this group of women the relative risk for gonococcal PID was 2.8; for nongonococcal PID, 6.5, suggesting that the IUD increased the risk of nongonococcal PID more than the risk of gonococcal PID (56).

A US case-comparison study of 350 women by William Faulkner and Howard Ory showed that IUD users had about five times as great a risk of developing febrile PID as nonusers (59). Thirty-eight percent of women with febrile PID were using an IUD at the time of diagnosis, compared with 11 percent of controls and 24 percent of women with afebrile PID. The investigators looked at cases with a temperature of at least 38° C separately to be certain that biased diagnosis did not account for the association.

A puzzling finding in a recent study by Michael Smith and Richard Soderstrom is the high incidence of salpingitis (tubal inflammation) among IUD users (280). Chronic, nonbacterial salpingitis was observed in 23 out of 49 IUD users (47 percent) undergoing laparoscopic sterilization compared with only 10 in 1,500 nonusers (0.7 percent). Smith and Soderstrom comment:

> Perhaps this observation lends additional histologic support to those who propose decreased host resistance to bacterial infection as the explanation for IUD-related inflammatory morbidity. Although speculative, it seems logical that organisms gaining entrance to the reproductive tract at the time of menstruation are disposed of less well by the chronically inflamed endometrium and oviduct (280).

They suggest that chronic tubal inflammation may be responsible for some of the symptoms commonly associated with IUD use, such as heavy, noninfectious leukorrhea and chronic pelvic discomfort.

There is also evidence from the developing world of IUD-related PID. In Thailand, investigators at four Bangkok hospitals looked for evidence of past pelvic infection among more than 1,500 healthy, previously fertile women seeking sterilization (40). Nearly 10 percent showed evidence of previous infection; users of IUDs only had the highest percentage of tubal adhesions, 12.3; users of steroidal contraceptives only had the lowest percentage, 4.1 to 4.9.

PID among IUD users has involved a number of different organisms (36), many of which can spread through the reproductive system. Acquired gonorrhea in IUD users, for example, has a tendency to ascend, leading to tubal and other pelvic infections (244, 299). In other words, while the gonococcus may be important in initiating acute PID, its primary role may be in preparing the way for secondary invaders from normal vaginal flora to reach the upper genital tract (36). It should be noted that copper IUDs do not provide the toxic action against gonococci in women that they exhibit in vitro (207). Infected

Table 15. Pelvic Inflammatory Disease (PID) and IUDs, Selected Studies, 1968-1977

Author & Date	Ref. No.	Place	Study Design	Number of Women	Description	Findings
Combined Bangkok Hospital Group & Wright 1975	40	Thailand	Cohort	1,583	At sterilization, women were examined for evidence of old infection.	10.9% of 516 who had ever used IUDs had tubal adhesions, compared with 6.0% of 1,067 never users (p=0.001); 12.3% of 162 who had used only IUDs had adhesions, not significantly different from never users. Risk decreased with duration of use.
Eschenbach et al. 1977	56	USA	Case-comparison	204 cases, 707 controls	IUD use in those diagnosed as having acute PID compared with use in controls from venereal disease and gynecology clinics.	30% of cases and 15% of controls used IUDs (p<0.005). In 157 matched pairs of cases and controls, 29% of cases used IUDs, 10% of controls; relative risk: 4.4 (p<0.001). 19% of 53 never pregnant cases used IUDs, 2% of 53 matched controls; 33% of 120 previously pregnant cases used IUDs, 15% of matched controls.
Faulkner & Ory 1976	59	USA	Case-comparison	150 cases, 200 controls	IUD use in 50 cases with fevers of 38° C or more and 100 cases with lower temperatures compared with use in controls.	38% of cases with fever used IUDs, 24% of cases without fever, 11% of controls. Age-standardized risk ratios: fever cases: 5.1; cases without fever: 2.7. No duration of use effect.
Lippes 1975	158	USA	Case-comparison	91 cases, 38 controls	IUD use compared in cases and controls. Data from inpatient records.	14.3% of cases and 7.9% of controls used IUDs; risk ratio: 1.9 (not significant, p>0.05)
Phaosavasdi et al. 1975	216	Thailand	Cohort	200	At sterilization, women were examined for evidence of infection.	28% of 101 IUD users had evidence of PID, compared with 4% of 73 users of hormonal contraception and none of noncontraceptors. PID less common in those whose IUDs were inserted within 3 months postpartum or postabortion than at other times. Risk increased with duration of use.
Targum & Wright 1974	307	USA	Case-comparison	50 cases, 50 controls	IUD use compared in cases and controls.	48% of cases and 10% of nonsterilized controls used IUDs (p<0.001). 59% of ever pregnant cases used IUDs, 45% of never pregnant cases. No duration of use effect.
Vessey et al. 1976	341	Britain	Cohort	17,032	Rates of diagnosis of salpingitis, PID, endometritis compared for IUD users, diaphragm users, and OC users. 18.6% of participants used IUDs at entry into study, 56.6% OCs, 24.8% diaphragms.	Rate per 1,000 woman-years of follow-up by method at entry: IUDs: 2.46; OCs: 1.02; diaphragms: 0.94 (p<0.001). Rate of new cases by method actually used: IUD: 2.59; not IUD: 0.94 (p<0.001)
Weström et al. 1976	358	Sweden	Case-comparison	515 cases, 741 controls	IUD use in cases of laparoscopically verified acute salpingitis compared with use in controls, all using some contraceptive method.	24.3% of cases and 9.7% of controls used IUDs; relative risk: 3.1. Relative risk for never pregnant: 6.9; for those pregnant at some time: 1.7. Pregnancy status made greatest difference in risk for those age 20 or younger. Overall, risk declined slightly with age, but trends by pregnancy status not consistent. (See Ory (207).)
Wright & Laemmle 1968	369	USA	Cohort	108 cases within 1 year of end of last pregnancy	Cases were women with "definite" first diagnosis of PID who had returned to hospital to obtain contraception at postpartum clinic. Rates by contraceptive method estimated on basis of method choices of all postpartum clinic attendees in same period.	Estimated rates per 1,000 woman-years: IUD: 66.2 OC: 13.4 other (barrier & rhythm): 25.2

ovarian cysts have also been seen in IUD users; microorganisms present in one study included *staphylococcus aureus hemolyticus* and *coli bacillus* (73).

Pelvic actinomycosis, a fungus infection which was formerly quite rare, has now been reported in a number of IUD users (86, 109, 151, 254). These cases include both women with severe pelvic infection and women in whom evidence of the disease was found only at the time of IUD removal (72, 92). Health personnel should be aware of the possibility of actinomycosis infection in any users of IUDs who have a persistent vaginal discharge (86). The recommended treatment is large doses of penicillin or other antibiotics (254).

The question of whether the transcervical tails used on IUDs increase the risk of infection as compared with tailless devices has not been resolved. This first became a matter of concern in 1973 and 1974 with reports of deaths from septic abortion among US women using the Dalkon Shield (124, 154, 327). Tatum suggested that the multifilament tail of the device could act as a wick to permit the ascent of pathogenic bacteria from the vagina into the uterus (314, 315, 316). This theory has not been universally accepted, however. Willard Cates and colleagues pointed out that two sizes of Dalkon Shields were in use at the same time — the standard size and a smaller size for nulliparous women, both with the same kind of tail — and the morbidity and mortality were reported only with the larger model (33).

Measures to prevent or minimize the risk of IUD-related pelvic infections have so far centered on the insertion process. Bacteria are invariably introduced into the uterine cavity at that time, even though Daniel Mishell and Dean Moyer have shown that the uterus normally cleanses itself of bacteria within 48 hours (183). Nevertheless, although no systematic evaluation has been made, it seems a reasonable precaution to ensure that both the IUD and the insertion equipment are sterile at the time of insertion.

Women with evidence of pelvic infection should not be fitted with an IUD until the infection has cleared. Where possible, IUD recipients should be screened by culture for asymptomatic gonorrhea (151, 337). Young women under 30 who have multiple sexual partners and frequent sexual relations should be warned that IUD use will further increase the risk of PID (207).

Opinion is divided on the best course of treatment once PID has been diagnosed in an IUD user. Some US physicians recommend removing the device immediately, especially if the infection proves to be gonorrheal (72, 244, 299). Others recommend treatment with antibiotics and removal of the device only if the patient does not respond quickly to treatment (178). Current US Food and Drug Administration professional and patient labeling recommends immediate treatment with a broad spectrum antibiotic, and removal only if marked improvement does not follow treatment within 48 hours (337).

PREGNANCY

When an IUD fails and pregnancy occurs, the pregnant woman needs the special attention of health care personnel. If she wishes to continue the pregnancy, removing the IUD will improve her chances of having an uncomplicated pregnancy and delivery, but her risks will still be higher than those of non-IUD users. A pregnancy in an IUD user is more likely to be ectopic than in a nonuser, but whether IUDs cause ectopic pregnancy or simply fail to prevent it adequately is not yet clear. Health personnel need to be particularly alert to the possibility of ectopic pregnancy because its symptoms can be mistaken for side effects of the device itself.

Uterine Pregnancy

A uterine pregnancy occurring with an IUD in place is more likely to end in spontaneous abortion than a pregnancy in a woman not using an IUD. Other complications of pregnancy may also be more frequent, but there is no evidence that the pregnancy is more likely than usual to result in an infant with congenital anomalies (181, 215, 285). In a few cases infection of a midtrimester pregnancy with an IUD in place has led to the user's death.

Studies of uterine pregnancy after IUD failures show consistently that about half will end in spontaneous abortion, usually in the first trimester, if the device remains in place (12, 140, 155, 268, 285, 313, 342, 346). This is three to eight times the rate of miscarriage for other women (138, 268, 342). Furthermore, a recent US case-comparison study involving 287 cases found that IUD users were about twice as likely to develop fever (symptomatic of infection) at the time of spontaneous abortion as were nonusers (138). Removing the IUD will cut the risks of spontaneous abortion at least in half (12, 285, 313). There is also some evidence that the continued presence of an IUD increases the risks of premature delivery (12) and stillbirth (268). Tatum and colleagues observed that four times as many premature births occurred when copper Ts were left in place as when they were removed (313).

In the early 1970s accumulating case reports in the US focused attention on a small number of deaths from septic abortion in IUD users. A survey of US physicians conducted by the USFDA's Advisory Committee on Obstetrics and Gynecology uncovered 289 cases of septic midtrimester abortion in IUD users, including 21 deaths (124). A subsequent analysis of data for 1972 through 1974, conducted by the US Center for Disease Control (CDC), estimated that about 15 deaths occurred for every 100,000 pregnancies with an IUD remaining in place (33). Of the 50 US deaths associated with spontaneous abortion in those years, 23 were IUD users'. While the death-to-case rate for IUD users is more than 50 times higher than that for US non-IUD users in that period, the figure makes clear how rare such deaths were. The deaths apparently occurred in women whose initial complaints were general symptoms of septicemia rather than the uterine cramping and bleeding that usually are the first signs of spontaneous abortion (33, 39). Nonfatal cases of febrile spontaneous abortion in IUD users have exhibited the same symptoms as those seen in non-IUD users, raising the possibility that the deaths occurred because the nature of the symptoms in these IUD users delayed correct diagnosis (138).

The news of septic abortion deaths in IUD users led to withdrawal from the market of the Dalkon Shield, a device that appeared at the time to be particularly associated with such deaths (154). Reanalysis of the data by the CDC has shown the Dalkon Shield to have had about three times the risks of other devices — a less dramatic difference than was first suspected (33). Attention focused on the Dalkon Shield may have obscured the fact that septic abortion, with risk of death, apparently can occur with any IUD. For example, cases of nonfatal septic abortion in users of copper devices have recently been

Table 16. Ratios of Ectopic to Uterine Pregnancies in IUD Users and in National and Hospital Populations, Selected Studies, 1968-1978

Author & Date	Ref. No.	Device/ Location	No. of Ectopic Preg-nancies	Ratio Ectopic/ Uterine (%)
IUD USERS				
Alza Corporation 1976	13	Progestasert/ North America	17	21
Hallatt 1976	93	Not specified/Los Angeles (USA)	15	5.5
Jain 1977	119	Lippes Loop/ Taichung, Taiwan	3 5 5 13	≤ 1 year: 0.78 1-3 years: 1.30 ≥ 3 years: 3.97 all: 1.45
Snowden et al. 1977	285	Various/ Britain	25	5.4
Steven & Fraser 1974	300	Various/ Edinburgh, Scotland	4	4.9
Tatum & Schmidt 1977	312	TCu-200/ US & Canada	5 5 4 14	≤ 1 year: 1.6 1-2 years: 3.0 ≥ 2 years: 7.3 all: 2.6
Tietze & Lewit 1970	323	Unmedicated/ international, mostly US	34	4.3
Vessey et al. 1974	342	Various, mostly Lippes Loop & Saf-T-Coil/Britain	1 1 6 8	≤ 2 years: 2.6 2-4 years: 3.6 ≥ 4 years: 26.1 all: 8.9
Virkar & Parulkar 1974	346	Soonawala & Antigon/ Bombay, India	2	4.1
Wei 1968	353	Ring & Lippes Loop/Taiwan	35	7.7
NATIONAL AND HOSPITAL POPULATIONS				
Erkkola & Liukko 1977	55	Turku, Finland, 1966-75	345	0.60-1.08
Helvacioglu et al. 1979	108	Chicago, USA, 1968-75	313	1.4
Kallenberger et al. 1978	131	Oklahoma City, USA, 1960-75	947	0.5
Lehfeldt et al. 1970	152	USA, 1967	4,154	0.51
Rantakylä et al. 1977	231	Oulu, Finland, 1972-74	71	0.78
Savolainen & Saksela 1978	253	Helsinki, Finland, 1968-74	988	1.3-2.5
Tatum & Schmidt 1977	312	New York, USA, 1970-74 whites: nonwhites:	 391 764	 0.30 0.67

reported (313, 344). Removing the IUD as soon as pregnancy is detected appears to eliminate the risk; in the 17 months after the USFDA and the manufacturer of the Dalkon Shield instructed doctors to remove IUDs from women who became pregnant, no septic abortion deaths of IUD users were reported (33).

Ectopic Pregnancy

Ectopic pregnancy — occurring when a fertilized ovum implants outside the uterus, in the oviducts, ovaries, or abdomen — is a life-threatening condition that demands surgery as soon as it is detected. In the US and Britain ectopic pregnancy accounts for about 10 percent of maternal deaths, a percentage that has risen recently as rates of maternal mortality generally have declined faster than death rates for ectopic pregnancy (23, 256). In developing countries, the scarcity of emergency surgical care makes the condition more dangerous than in developed countries. Mortality rates in developing countries may therefore be considerably higher than the estimated two to four per 1,000 cases in the US and Great Britain (23, 108, 256).

When a pregnancy occurs in an IUD user, the chances that it is ectopic are greater than for a non-IUD user. In studies of IUD users the proportion of pregnancies that are ectopic has varied from less than 1 to more than 25 percent. Most are in the range of 1 to 5 percent (see Table 16). By comparison, in studies comparing ectopic pregnancies to deliveries in hospital the highest proportion is about 4 percent of all deliveries, reported from Taiwan (353) and Jamaica (214). Most research in the US, Finland, and Britain has found proportions near or below 1 percent (23, 55, 108, 131, 231, 312). For an IUD user, the chances that a pregnancy will be ectopic have been roughly estimated to be 7 to 10 times higher than for a nonuser, or approximately one in 30 as compared with one in 250 pregnancies of non-IUD users (21, 181, 215, 217).

The greater likelihood that an IUD user's pregnancy will be ectopic requires that health personnel be alert to the possibility of ectopic pregnancy and also warn women using IUDs. Careful diagnosis is especially important because the symptoms of ectopic pregnancy — abdominal pain, heavy bleeding, and amenorrhea — are often attributed initially to the IUD itself. In one US series of 70 ectopic pregnancies in IUD users, 85 percent were misdiagnosed on the first visit (93).

The higher ratio of ectopic to uterine pregnancies in IUD users could be explained in two ways: either (1) IUDs do not prevent ectopic pregnancy as well as they prevent uterine pregnancy (152, 323) or (2) IUD-related inflammation or infection in the tubes interferes with the movement of the fertilized ovum, making ectopic pregnancy more likely (312). While these hypotheses are not mutually exclusive, the relative roles they might play would affect the incidence of ectopic pregnancy in IUD users.

Reliable comparisons of the incidence of ectopic pregnancy in IUD users and nonusers cannot be made with the data now available. The ideal study — a large-scale cohort study of IUD users and nonusers, with pregnancies reported in life table format — has not been published (18). Some researchers have reported the number of ectopic pregnancies per 1,000 woman-years of IUD use. These rates range from less than one to four (see Table 17). Difficulties in identifying proper comparison groups make the meaning of these rates uncertain. Studies that compare ectopic pregnancy rates in IUD users with rates in other populations run the chance of selecting a comparison group that differs from the IUD users in ways that affect the risk of ectopic pregnancy (18). For example, risk of ectopic pregnancy rises with age and is higher for women with a history of ectopic pregnancy or of pelvic infection (65, 108, 131, 253, 257, 301, 312). In some countries, ratios of ectopic to uterine pregnancies are lower in whites than in nonwhites (312, 339). Furthermore, in Britain, Finland, the US, and Sweden, ectopic pregnancy rates have risen rapidly over the past several decades (23, 253, 273, 355). All these factors must be taken into account when choosing a comparison group.

Until recently the consensus was that IUDs simply fail to provide as much protection against ectopic pregnancy as they do against uterine pregnancy (57, 152, 323). Hans Lehfeldt and colleagues estimated in 1970 that IUDs reduced uterine implantations by 99.5 percent, tubal implantations by 95 percent, and ovarian implantations not at all (152). A Finnish study has reached a similar conclusion (253). The hypothesis is biologically plausible because the IUD is a locally acting device, and its effect, therefore, may not always extend to the oviducts.

The Lehfeldt-Tietze hypothesis has recently been challenged by Howard Tatum and Frederick Schmidt (312) on the basis of data showing an increase in the ratio of ectopic to uterine pregnancies with increasing duration of IUD use in three studies (119, 313, 342). This duration of use effect would suggest a causal relationship between IUDs and ectopic pregnancy. However, because uterine pregnancy rates decline with duration of IUD use while at the same time the risk of ectopic pregnancy increases with age, ratios of ectopic to uterine pregnancies would be expected to increase over time in any case. As a result, these data are difficult to interpret.

Two studies of ectopic pregnancy rates expressed in ways unrelated to uterine pregnancy rates offer stronger evidence of a duration-of-use effect. Irving Sivin, in a report of life table rates of ectopic pregnancy in copper T users, found a significant increase between the second and third years of use, although there was little change between the first and second or third and fourth years (273). Similarly, the Alza Corporation's study of the Progestasert showed an increasing rate of ectopic pregnancy over a year's time — 2.43 per 1,000 woman-years in the first six months and 5.05 in the last six months (13). Even in these instances, however, the apparent duration-of-use effect cannot be considered clear evidence for a cause-and-effect relationship because the highly fertile will become pregnant early in the study, leaving an increasing proportion of subfertile women and women with chronic pelvic inflammatory disease, who may be at greater risk of ectopic pregnancy (242).

Sivin has compared the rate of ectopic pregnancies in users of unmedicated IUDs as reported in the CSP — 1.188 per 1,000 woman-years — with rates for US women in general calculated from the data of the US National Hospital Discharge Survey. These rates range from 0.38 per 1,000 women aged 15 to 44 in 1965 to 0.83 in 1977. The difference from the CSP rate, Sivin reports, is attributable to the proportion of the population that is at little or no risk of ectopic (or uterine) pregnancy; eliminating these women from consideration, he estimates that the rate of ectopic pregnancy in IUD users is close to that in women using traditional methods or no method at all. The implication is that the IUD offers little if any protection against ectopic pregnancy but neither is it a substantial cause of ectopic pregnancy. While noting that his data, which include the apparent duration-of-use effect for copper T users, "do not necessarily

Table 17. Ectopic Pregnancy and IUD Use, as Measured by Life Table and Pearl Formula Techniques, Selected Studies, 1976-1979

Author & Date	Ref. No.	Contraceptive Method	No. of Ectopic Pregnancies	Rate
LIFE TABLE				**(per 1,000 women)**
Alza Corporation 1976	13	Progestasert	17	At 1 year: 3.7
Sivin 1979	273	TCu		At 1 year: 0.63 At 2 years: 1.11 At 3 years: 3.09 At 4 years: 3.68
PEARL FORMULA				**(per 1,000 woman-years)**
Alza Corporation 1976	13	Progestasert	17	3.4
Barron et al. 1979	21	Lippes Loop C & D	2	0.7
Sivin 1979	273	TCu	28	0.74 Adequate follow-up only: 0.96
		(All US women aged 15-44)		Estimated: 1965: 0.38 1973: 0.57 1976: 0.72
		Traditional methods & none		Estimated: 1965: 0.68-0.72 1973: 1.15-1.25 1976: 1.53-1.63
Snowden 1977	283	TCu & Cu-7	2	0.6
USFDA 1979	334	Unmedicated		1.2
		TCu		0.5
		Cu-7		0.4
		Progestasert		4.0
Vessey et al. 1976	341	Various IUDs, mostly Lippes Loop & Saf-T-Coil	8	0.82
		OCs	0	—
		Diaphragm	0	—
		Other & none	3	0.34
Weström 1979	355	Various IUDs		4
		None		4

constitute a clean bill of health for the IUD," Sivin concludes that, "The IUD could not have been a major factor contributing to the recent doubling in the rate of ectopic pregnancy in the U.S." (273). With less than 10 percent of US women of reproductive age using IUDs (62), clearly other factors are chiefly responsible for the rising incidence of ectopic pregnancy.

Comparative data for the period 1968 to 1975 were collected in the Oxford/Family Planning Association study of over 17,000 British women using various contraceptive methods. Eight ectopic pregnancies occurred in 9,768 woman-years of IUD use, for a rate of 0.82 per 1,000 woman-years. There were no ectopic pregnancies in 22,955 woman-years of oral contraceptive use or in 11,481 woman-years of diaphragm use. Three ectopic pregnancies occurred in 8,744 woman-years of follow-up of women using other contraceptive methods or no method at all, for a rate of 0.34 per 1,000 woman-years (341).

Another important study, covering all pregnancies in the Swedish city of Lund from 1960 to 1977, shows a threefold increase in ectopic pregnancies, from 0.57 per thousand women aged 15-39 in 1960-64 to 1.42 per thousand in 1975-77. Even though ectopic pregnancy is normally more common among older women, during the latter period the rates for women aged 20-29 exceeded those for women aged 30-39.

Table 18. Annual Incidence of Ectopic Pregnancy per Thousand Women in Lund, Sweden, 1960-64 and 1975-77

	1960-64	1975-77
Women aged 20-29	0.63	1.76
Women aged 30-39	0.77	1.42

Source: Weström (355)

Lars Weström attributes some of this rise in ectopic pregnancy to the increased prevalence of IUD use — from 40 to 126 per thousand women aged 20-29 between 1970 and 1975 — and to a substantial increase in pelvic inflammatory disease. Comparing ectopic pregnancy rates in IUD users and in sexually active users of no contraception between 1965 and 1977, he found the rates identical — 4 per thousand woman-years (355).

While the epidemiologic data are uncertain, the hypothesis that IUDs increase the incidence of ectopic pregnancy is plausible. IUDs are known to be related to an increased incidence of pelvic inflammatory disease (see p. B-67), which could affect the tissue of the oviducts (312). A history of pelvic infection is common in women with ectopic pregnancies (93, 131, 350) and has long been considered an important risk factor (49, 65). The relationship between PID and ectopic pregnancy is difficult to quantify, however, because PID is so often asymptomatic (351). The best data come from Weström, who reported 19 ectopic pregnancies in 412 women studied 6 to 14 years after laparoscopically verified diagnosis of PID. Almost 4.2 percent of pregnancies in this group were ectopic, compared with only 0.7 percent in a group of 282 women of comparable age and parity who, when examined via laparoscope, had showed no signs of PID (356). While lower rates of reported PID have been seen in IUD users who developed ectopic pregnancies than in nonusers (55, 93), this may be because women with a known history of infection are not likely to be provided with IUDs (55) and infections in IUD users may have been subclinical (350).

Questions have been raised about whether ectopic pregnancy rates differ among devices. In particular, the ectopic pregnancy rate reported by the manufacturers of the Progestasert has drawn attention (283, 334). Data submitted by the Alza Corporation to the USFDA show a rate of ectopic pregnancy of 4.0 per 1,000 woman-years in 126,800 woman-years of use (334). Alza researchers point out that comparisons of data on the Progestasert, gathered in the mid-1970s, with data on inert devices from the CSP, gathered in the 1960s (showing 1.2 ectopic pregnancies per 1,000 woman-years), neglect the secular rise in ectopic pregnancy rates in the US (217). Also, differences in duration of use in these and other IUD studies as well as differences in populations make comparisons among studies difficult to interpret. Nonetheless, the difference in rates (see Table 17) is large enough that the USFDA, in the January 1979 issue of its newsletter to health professionals, wrote, "FDA wants to alert medical professionals to evaluate carefully patients who become pregnant while wearing Progestasert IUD's, to determine whether or not the pregnancies are ectopic" (334). Higher than expected ectopic pregnancy rates have also been noted with the minipill, the progestin-only oral contraceptive (24, 27, 164, 281) (see **Population Reports**, Series A, Number 3, *Minipill – A Limited Alternative for Certain Women*, September 1975). It has been pointed out that both the Progestasert and the minipill derive their effectiveness from progestational hormonal action (67), but ectopic pregnancy rates for the Progestasert and for its plastic component without progesterone are similar (217).

The question has been raised whether ratios of ectopic to uterine pregnancy remain high after discontinuation of IUD use. This might be expected if the IUD had an effect on tubal tissue that lingered after the device was removed (312). Data on planned pregnancies in IUD users are few (255, 312, 341) and do not suggest rates of ectopic pregnancy outside the range of rates seen in large populations.

Overall, some evidence hints at a higher incidence of ectopic pregnancies in IUD users than in users of other contraceptives or of no contraceptives, but it is far from conclusive. Regardless of the resolution of this question, when a woman with an IUD becomes pregnant, the risk of an extrauterine pregnancy of between one and five per 100 pregnancies constitutes sufficient danger to warrant special attention.

Lactation

Evidence from both developed and developing countries confirms that breast milk is the most nutritious, economical, and appropriate food for infants. Breast-feeding has some effect in delaying ovulation but is not effective as a long-term contraceptive method. Therefore, lactating women need to use effective methods of family planning in order to avoid pregnancy and assure continued lactation until the desired weaning time. There is no evidence that IUDs in any way inhibit lactation or adversely affect the quality of breast milk. With regard to a possible positive effect of IUDs on lactation, data are conflicting. A few reports suggest that the IUD is associated with longer periods of lactation while others suggest that there is no cause-and-effect or biological link.

Some studies show that women with IUDs breast-feed longer than women who use other contraceptives. A 1967 study of 276 Chilean mothers showed that the average lactation period for women using an IUD was two months longer than for the same women during a previous period of lactation without an IUD, and that the average lactation period for IUD users was about twice as long as for women in the study who used oral contraceptives (386). Analysis of a cohort of 794 Philippine women who delivered in a hospital found that the average period of breast-feeding simultaneous with pill use was three months; with conventional contraceptives, seven months; and

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GUIDELINES FOR USE OF IUDS

IUDs are a safe and effective method of family planning.

Estimated Event Rates at 12 Months:

pregnancy	**1-6 per 100 users**
expulsion	**5-20 per 100 users**
bleeding and pain removals	**5-15 per 100 users**
other medical removals	**3-9 per 100 users**
mortality	**0.0001-0.001 per 100 users**

These guidelines largely reflect the 1978 USFDA report. Further discussion of controversial points, recent findings, and causal mechanisms together with source references may be found in the text of Population Reports, Series B, Number 3, *IUDs — Update on Safety, Effectiveness, and Research,* May 1979.

Counseling

Before any IUD is inserted, the potential user should be counseled by and be able to ask questions of someone who:

- speaks her own language
- is sympathetic to her personal needs
- has time to provide all the information desired
- is well-informed about the IUD
- understands alternative family planning choices
- is candid but not alarming about possible problems including pregnancy, expulsion, pain, bleeding, and infection
- informs the user of the type of IUD to be inserted and the proper time for replacement if any active ingredients are included
- sets up a follow-up appointment if possible after 1 to 3 months
- tells the user where follow-up care is available.

Medical Contraindications

known or suspected pregnancy
pelvic infection
congenital uterine abnormalities
gonorrhea
severe cervicitis
abnormal pelvic bleeding
gynecological malignancy
endometritis
severe cervical stenosis
disorders of the blood or coagulopathy

Possible Contraindications

history of ectopic pregnancy
menstrual disorders

Timing of Insertion

IUDs may be inserted at the convenience of the user if it can be reasonably determined that she is not pregnant. During menstruation, after a pregnancy aborted before 12 weeks of gestation, and within the first week after delivery are appropriate times although special care should be taken with early postpartum and immediate postabortion insertions to insure proper placement of the device and to avoid perforation.

Insertion Technique

The safest rule is to follow meticulously the manufacturer's instructions. IUDs should be inserted high in the uterus with care to avoid perforation. IUDs and instruments inserted in the endocervical canal and/or uterus must be sterile. The following steps are recommended in the 1978 USFDA report for late menstrual insertion:

1. Administer analgesics and sedatives if needed. Use atropine if there is reason to expect syncope. Usually, IUD insertion involves brief discomfort rather than pain.
2. Insert a speculum into the vagina and inspect the cervix and vaginal walls.
3. Take a Papanicolaou smear, if possible, and a culture for gonorrhea. These are measures of preventive medical care and should not be prerequisites for IUD insertion.
4. Perform a bimanual examination to determine the size, shape, position, and mobility of the uterus and to rule out malignancy or inflammation of adjoining organs.
5. Reinsert the speculum and swab the endocervix and vaginal walls with an antiseptic solution.
6. Use intracervical anesthesia or a paracervical block at this time, if necessary. This may be helpful for women who have never been pregnant, women with cervical stenosis, or women who may experience syncope.
7. Place a tenaculum on the cervix and apply gentle traction to correct uterine flexion and stabilize the uterus. This will minimize bleeding and perforation.
8. Insert a uterine sound to determine the condition of the endocervical canal and the internal os and the position and depth of the uterus. If the uterus is smaller than 6.0 to 6.5 cm in depth, a smaller than standard IUD should be considered.
9. Insert the IUD following manufacturer's instructions, high into the uterine fundus, with only the thread remaining in the endocervical canal.

Syncope

Syncope, a sudden suspension of circulation and respiration, may occur in some women during insertion. To prevent syncopal attacks in women prone to vasovagal reactions, atropine may be administered intravenously or mild sedatives and local anesthesia used. Inhalation of spirits of ammonia and rest in a horizontal position is the usual treatment for mild syncope.

Expulsion

Expulsion, either noticed or unnoticed, full or partial, may occur at any time but is most common during the first postinsertion menses. Every user should be shown how to check for the presence of the tail or thread after each menstrual period to be sure the IUD is in place and told to return to the provider for a check-up if the tail cannot be located. More than half the women who expel IUDs will retain them if they are reinserted.

Complications

Perforation occurs in less than one-tenth of one percent of users, almost always at the time of insertion, when it may be accompanied by sudden pain and/or bleeding. Asymptomatic perforation may be noted at any time. If perforation is suspected, it is first essential to determine whether the woman is pregnant. If not, the uterus should be probed. Posterior and lateral x-rays or insertion of a second IUD to locate the uterus, by x-ray, may be used, but ultrasonography is preferable for a pregnant woman.

Closed devices that have perforated the uterus should be removed immediately to prevent possible bowel strangulation. Devices containing copper should be removed as soon as possible to prevent growth of intraperitoneal adhesions. Medical opinion differs as to the need to remove linear devices, which may in some cases cause intestinal obstruction but usually do no harm.

Laparoscopy, colpotomy, or culdoscopy may be used to locate and remove a perforating IUD. Laparotomy may be necessary if adhesions have formed and endoscopic instruments are not available.

Embedding. If the IUD is known to be deeply embedded in the endometrium or the myometrium, it should be removed (see **IUD Removal** below).

Bleeding and Pain. These common symptoms are the major medical reasons women discontinue IUD use. Spotting occurs in many users. An increase in menstrual blood loss is to be expected. With unmedicated IUDs, average blood loss is about twice as high as in previous cycles. With copper IUDs, blood loss is about 50 percent higher than previously. With progesterone-releasing IUDs, menstrual blood loss is less than in previous cycles, but spotting and midcycle bleeding are more frequent. Bleeding and cramps may seem to be heaviest in the first three months. Family planning providers should reassure and encourage users; analgesics may be given for cramping and antifibrinolytic agents have been used in some cases to limit heavy bleeding. Sympathetic attention may be as effective as any medication tested to date in encouraging continuation. If heavy bleeding and discomfort continue, the user is likely to want the IUD removed and will need advice on alternative methods.

Infection. Pelvic inflammatory disease (PID) and other forms of infection occur more frequently in IUD users than in nonusers. This may be a special problem for young nulliparous women. The usual symptoms are vaginal discharge, pelvic pain or tenderness, abnormal bleeding, chills, and fever. A broad-spectrum antibiotic effective against gonorrhea should be used against PID. If this treatment does not provide relief in 24 to 48 hours, the device should be removed. If pelvic abscesses or peritonitis develops, intensive antibiotic therapy should be provided at once, changing medication if necessary and taking account of the possibility of anaerobic bacteria.

Pregnancy occurs in 1 to 6 per hundred IUD users per year, making IUDs second only to sterilization and oral contraceptives as a highly effective modern method of contraception. While many women have successfully completed pregnancy with an IUD in situ, the risks of spontaneous abortion and septic midtrimester abortion are greater if the IUD remains in place. If the user wishes to continue an intrauterine pregnancy, an attempt should be made to remove the device with as little disturbance to the uterus as possible. If the device cannot be easily removed, the user should be warned that a hazardous septic midterm abortion may occur. This can begin with mild generalized flu symptoms, but, without immediate medical attention, it can be serious and even fatal.

Ectopic Pregnancy. If pregnancy does occur in an IUD user it is about ten times more likely to be an ectopic pregnancy than would be the case for a nonuser. Health care providers should be aware of this possibility. Women who experience the symptoms of ectopic pregnancy—abdominal pain, heavy nonmenstrual bleeding, and amenorrhea — should seek help immediately.

Medical Indications for IUD Removal

- pelvic pain and/or cramping
- abnormal or excessive bleeding
- acute pelvic inflammatory disease that does not respond to antibiotics
- displacement of IUD from uterus
- pregnancy, if removal can be accomplished without penetrating the uterine cavity
- uterine or cervical malignancy
- menopause

IUD Removal

If the tail or thread is visible, removal is usually simple. As at IUD insertion in a menstruating woman, the uterus should be examined bimanually and a speculum introduced to visualize the cervix. The tail or two threads of the IUD should be grasped with fingers or forceps and steady traction applied. If necessary, a tenaculum may be placed on the cervix to straighten the cervico-uterine angle.

If the tail or thread is not readily accessible, the cervix should be cleansed with antiseptic solution and the endocervix probed to locate the tail. Paracervical block, intracervical anesthesia, or prior use of laminaria may be necessary. As with insertion, a tenaculum may be needed to ease access and stabilize the uterus. Special instruments for IUD removal or other grasping instruments may also be used to probe for and extract the IUD. Aspiration of the uterus with a vacuum curette has also been used to retrieve threads retracted into the uterus. If these efforts are not successful, additional diagnostic measures such as sonograms and hysterograms are needed to be sure the IUD is in utero.

Follow-up Care

Women should be reexamined if possible within three months after IUD insertion. Annual checks are useful to be sure the device is still in place.

If threads are visible and the device appears to be in the uterine cavity, the thread should not be pulled. Medicated devices should be replaced at the recommended intervals. Women who have passed menopause should have devices removed since removal becomes more difficult after six months.

The "Guidelines for Use of IUDs" which appears on the preceeding pages can be detached from this issue of Population Reports and displayed on a wall.

with IUDs, nine months (396). In the same study, lactation continuation rates at one year, figured by the life table method, were 27 percent for pill users, 38 percent for noncontraceptors, and 42 percent for IUD users. Whether the IUD was responsible for longer lactation periods or, alternatively, women planning to nurse their infants for longer periods selected IUDs initially is not clear.

Biologically, no cause-and-effect link has been found between IUD use and lactation. In Cairo, Hefnawi and colleagues analyzed the amount and biochemical composition of breast milk from 150 women using Lippes Loops during the first year postpartum. When compared with normal lactation periods as determined by Hefnawi's earlier study of other Egyptian women, neither the amount nor the composition of milk appeared significantly affected by the IUDs (389).

Several studies have noted an increase in serum prolactin (the hormone responsible for the initiation of lactatogenesis) during IUD use (391, 395). A recent US investigation, however, found mean serum prolactin values for both short-term and long-term IUD users to be within the normal range; both unmedicated and copper IUDs were used in this study (399). Lactation was studied in a group of 185 Indian women who received a Lippes Loop postpartum (390). Compared with a group of 106 postpartum women without IUDs, the difference in duration of lactation was not statistically significant, nor was lactational amenorrhea affected by the IUD insertions.

In a US study, William Spellacy looked at the effects of progesterone-releasing IUDs on prolactin levels. Twenty-six women were tested before the insertion of a Progestasert and again at six- and twelve-month intervals. There were no significant differences in prolactin levels at the three times of testing (398). These results suggest that a progesterone-releasing IUD, like the other devices, has no effect on breastfeeding.

Subsequent Fertility

While it has been generally accepted and demonstrated that IUD use does not affect subsequent fertility (265, 323), a review of 2,536 users of Lippes Loops in Taiwan has raised anew the possibility that the longer a woman uses an IUD, the less her chances relative to nonusers of the same age group of conceiving after she discontinues the method (121). Among women over 35 the estimated proportion who failed to conceive within 36 months after discontinuation was three times as high among women using IUDs for less than one year. The authors hypothesized that pelvic inflammatory disease might be responsible and that this could also explain why rates of accidental pregnancy decrease with duration of IUD use (121).

While an effect of IUDs on subsequent fertility is not implausible, given the association between IUD use and pelvic inflammatory disease, these findings have yet to be confirmed. In Britain, in a smaller group of women, 48.5 percent of 258 who had their devices removed in order to become pregnant had not given birth after 12 months as compared with 29.4 percent of 1,085 women abandoning diaphragms or other traditional contraceptive methods. After 3½ years, however, only 1 former IUD user (0.4 percent) and 13 other women (0.8 percent) had not given birth. The average age in both groups of women was slightly over 30 (343). These figures suggest that some IUD users were slow to recover their fertility, but virtually all did so eventually. The effect on subsequent fertility of specific types of IUDs, as well as that of IUDs generally, deserves further study.

EVALUATION AND RESEARCH

Intrauterine devices are relatively easy to design, inexpensive to manufacture, and much less stringently regulated than drugs. As a result dozens of different models and configurations are in use throughout the world, many still being tested by individual developers. Some of the devices most widely known and utilized today are illustrated and described on pages B-86–B-89: the Lippes Loop, Saf-T-Coil, Cu-7 (Gravigard, TCu-200, TCu-220, TCu-380Ag, Multiload-cu250, Nova T, the Shanghai V, the Dana, and the Ohta Ring. Many other devices, including the Antigon, Birnberg Bow, Dalkon Shield, Spring Coil, M-shaped device with and without springs, intrauterine membranes, the Anderson leaf, and spirals, as illustrated in **Population Reports**, Series B, Number 2, IUDs *Reassessed—A Decade of Experience*, January 1975, have also been used, often in different sizes. Slight permutations of some designs are also being tested as carriers of active pharmacologic agents.

During the 1960s and early 1970s, the primary objective of IUD research was a better understanding of the mode of action of IUDs in order to provide a rational basis for improving their essential function — the prevention of pregnancy. Less emphasis was given to minimizing the incidence of side effects, such as expulsion or bleeding. Today, the emphasis is exactly the reverse (377). Preventing side effects which cause discontinuation — such as expulsion and bleeding — is the main challenge to IUD design (295).

Research activities involving IUDs today can be described in four different but overlapping categories:

- evaluation of performance characteristics of devices now in use with special attention to rare events or serious complications such as ectopic pregnancy and acute infection
- clinical testing of experimental designs, especially those containing active ingredients such as metallic salts, steroidal hormones, and antifibrinolytic agents, to determine the optimal amount and effective life of the active agents
- improvement of insertion techniques, measuring devices, and inserters to assure better fit and placement of devices within the uterus
- development and clinical testing of devices with biodegradable retentive components to reduce expulsion after postpartum or postabortal insertion.

As Table 19 shows, this research in IUDs is being conducted primarily by national and international governmental or nonprofit agencies. Since the financial returns to a commercial firm are small in developing and marketing simple plastic devices that may last ten years or longer, IUD research and development has been funded mainly by governments and foundations and carried out by individual clinicians and private nonprofit organizations. Only in the field of hormone-releasing IUDs has a commercial firm made a substantial contribution to research.

Evaluation of IUD performance characteristics which was initiated by the Population Council in 1962 is now carried out not only by the Council and its International Committee on Contraceptive Research but also by the International Fertility Research Program (IFRP), the United Kingdom IUD Research

Table 19. Major Current Research Programs Involving Intrauterine Devices

Organization	Ref. No.	Technology Being Tested	Purpose of Research	Location	Source of Funding	Approximate Annual Funding Level, 1978-1979
Alza Corporation (commercial firm)	13, 217	Progestasert IUD	To extend proven effective life of IUD beyond 12 months.	US	Own funds	NA
			To test devices carrying more than 38 mg of progesterone.	Mexico		
			To show decreased menstrual blood loss and cramping in US as shown in earlier European studies.	US		
			To test prophylactic value for women approaching menopause and/or with endometrial hyperplasia.			
Center for Population Research (government agency)	338	estriol-releasing T device	To determine whether estriol has a contraceptive effect within the uterus by binding to estrogen receptors and altering normal uterine cycle.	US	USNIH	$100,000-$200,000
		IUDs currently in use in the USA	To determine whether IUD use is associated with increased risk of hospitalization for serious gynecological and obstetric disorders, e.g., uterine perforation, pelvic inflammatory disease, vaginal hemorrhage, spontaneous fetal loss, ectopic pregnancy, abruptio placenta, and placenta previa.	US	USNIH	$500,000
			To determine risk ratios, severity of these conditions, and certainty of diagnosis with IUDs now in use (9 center case-comparison study).			
International Committee for Applied Research in Population (ICARP) (private nonprofit organization)	53, 191	TCu-380Ag	To test efficacy and safety of insertion after menstrual regulation by traditional healers.	India		$5,000
		Lippes Loop	To test efficacy and safety of post-abortal insertion.	Brazil		$5,000
International Fertility Research Program (IFRP) (private nonprofit organization)	147, 150, 223, 359	Lippes Loop TCu-220 Multiload others	To develop a) IUDs that will not be expelled if inserted in the immediate postpartum period, by adding biodegradable sutures to the Lippes Loop D and TCu IUDs to help hold the devices in place during involution and b) IUDs that slowly release trasylol or tranexamic acid (AMCA) into the uterine cavity to reduce IUD-related bleeding (using Lippes Loop D).	worldwide	USAID	$200,000-$300,000
			To conduct Phase III clinical trials to evaluate a) the performance of the sutured postpartum devices (rates of expulsion, removals for medical reasons, and infection), the optimal technique of postpartum insertion (hand versus inserter), and the best time for postpartum insertion (less than 10 minutes versus 2-36 hours postplacental); b) the effect of IUDs containing trasylol or tranexamic acid on menstrual blood loss, and c) other IUDs ready for Phase III testing such as the Nylon-wound T, the Population Council Postpartum T and TCu-380Ag, the Multiload, and the Alza Progestasert.			

Table 19 (Continued)

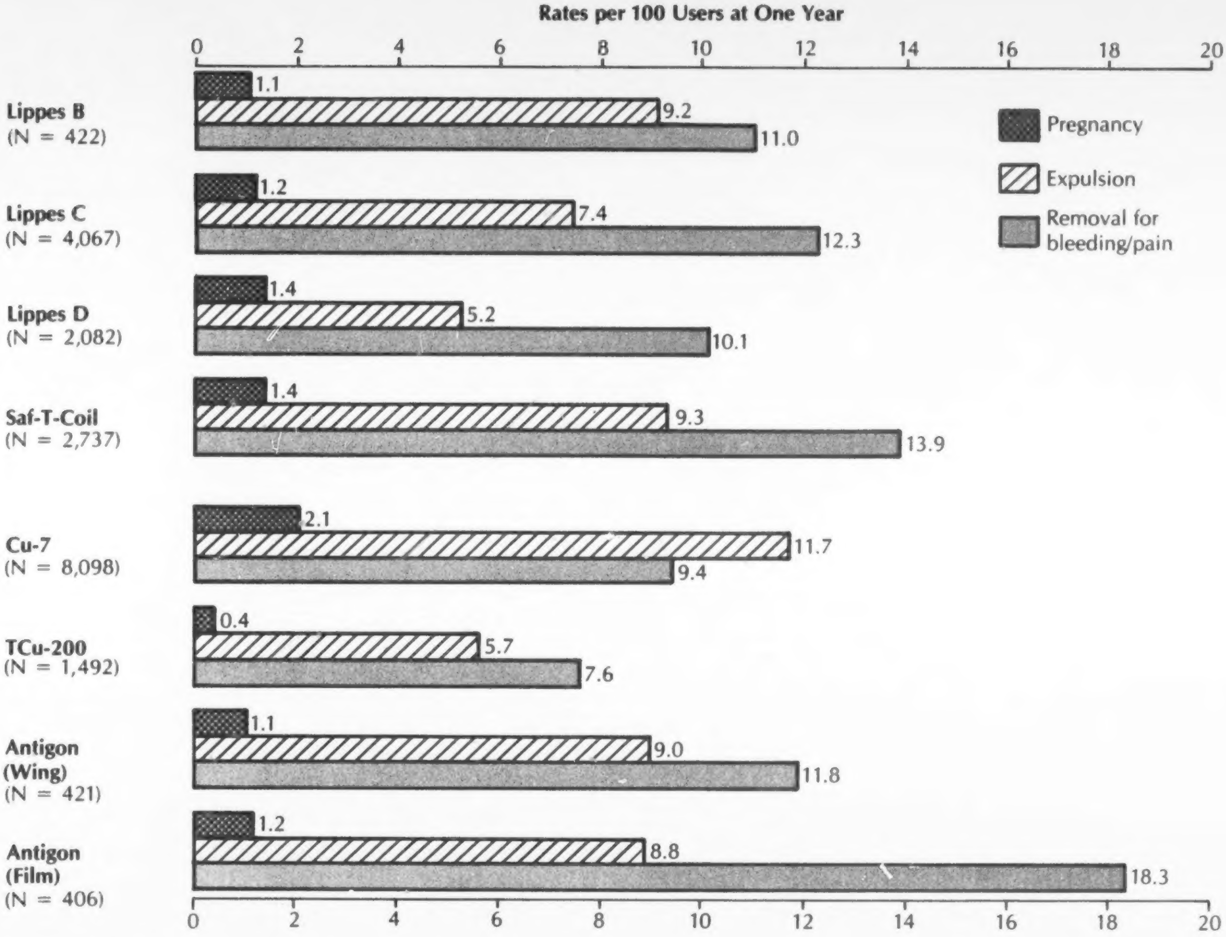
Population Council (private nonprofit organization)	191, 271	TCu-200 TCu-220 C TCu-380Ag	To determine effective life of medicated devices.		AID; UNFPA; other donors	$100,000
			To investigate use of a silver core for copper wire in TCu-380Ag.			
			To extend effective life by preventing fragmentation.			
			To investigate various safety aspects.			
			To investigate device releasing 10, 20, and 30 μg of norgestrel daily.	Finland		
Program for the Introduction and Adaptation of Contraceptive Technology (PIACT) (private nonprofit organization)	47, 187	Hasson Wing Sound & Uterine Metrology Device	To test whether uterine measurements can be used to identify women who are poor risks (a) using Hasson Wing Sound (for vertical measurement) and (b) using Uterine Metrology Device (for vertical and horizontal measurement).	Indonesia	UNFPA Ford	$30,000
			To test differences in insertions by MDs and paramedical personnel.	Mexico		
		Inserter	To test low-cost, reusable, flexible postpartum inserter for T-shaped IUDs and modified version for Lippes Loop, compared with hand or forceps insertion.	Mexico		
		Lippes Loop and copper devices	To study insertion immediately postpartum.	Mexico		
World Health Organization (WHO) (intergovernmental agency)	242, 368	Lippes D Cu-7 TCu-220	To test efficacy and safety of 3 IUDs inserted in multiparous women at the time of menses or immediately after (9 center randomized study).	Egypt, F.R. Germany, Hungary, India, Philippines, Thailand, UK, US, USSR	WHO	$300,000
			To study risk of pelvic inflammatory disease and ectopic pregnancy in IUD users (12 center case-comparison study).	Canada, Chile, Hungary, India, Korea, Nigeria, Philippines, Sweden, Thailand, UK		
			To study effect of IUDs and other fertility control methods on bacterial flora in the oviducts (12 center cohort study).	Canada, Chile, Colombia, Cuba, Korea, New Zealand, Singapore, Thailand, UK		
			To study extent and effects of uterine blood loss associated with IUDs.	Chile, Japan, Korea, Mexico, Sweden, UK		
		levonorgestrel IUD	To develop and test clinically an IUD releasing 2 μg or less daily of levonorgestrel with an effective life of at least 10 years and 50% reduction in menstrual blood loss.	Chile, Hungary, India, Korea, Mexico, Philippines, Sweden, Thailand, UK, Yugoslavia		

Programme at Exeter University, and the World Health Organization (WHO). Data are gathered from many centers using the same research protocols and pooled as appropriate for analysis.

As Table 11 and Figures 5 and 6 show, the differences in event rates among different centers or networks are almost as great as the differences among devices. Overall, the Lippes Loop D has lower termination rates than the other unmedicated devices while the TCu-200 has somewhat lower termination rates than the Lippes Loop. In the Exeter study, for example, the copper devices do not differ greatly from the Loops in pregnancy and expulsion rates, but they do show lower rates of removal for bleeding and pain (see Figure 5).

Recent Population Council studies have compared the TCu-200, which is now licensed for use in the US, with the TCu-220 and the TCu-380, both experimental devices (see Table 20). Unlike the TCu-200, which has copper wire only on the vertical arm, the TCu-220 has 7 copper sleeves, 5 on the vertical arm and one on each of the transverse arms. The TCu-380 has a copper sleeve on each of the transverse arms and a copper wire wrapped around the vertical arm. The positioning of the copper at the top of the device, resting in the fundus of the uterus, is believed to be the main reason for the lower pregnancy rates with the TCu-220 and 380 (see Figures 14, 15). The Population Council finds the TCu-380 somewhat easier to manufacture than the TCu-220. Also, based on data still unpublished, it has a slightly better performance record than the TCu-220. The Council has therefore decided to concentrate on the TCu-380 as its second-generation copper device rather than the TCu-220, even though the 220 has been more widely used (191).

Figure 5. One-year Net Event Rates After First Fittings, United Kingdom IUD Research Programme, 1972-1976



Note: Differences reflect differences in patient populations as well as in devices.

Source: Snowden et al. (285)

The World Health Organization has also been investigating various IUDs in international trials. WHO researchers are concerned about higher rates of removal for bleeding among the Lippes Loop users in their data. Since women in developing countries are often anemic and this anemia is aggravated by heavy menstrual bleeding, WHO is recommending that the TCu-220 be considered an alternative for women who experience problems with the Lippes Loop (242, 367).

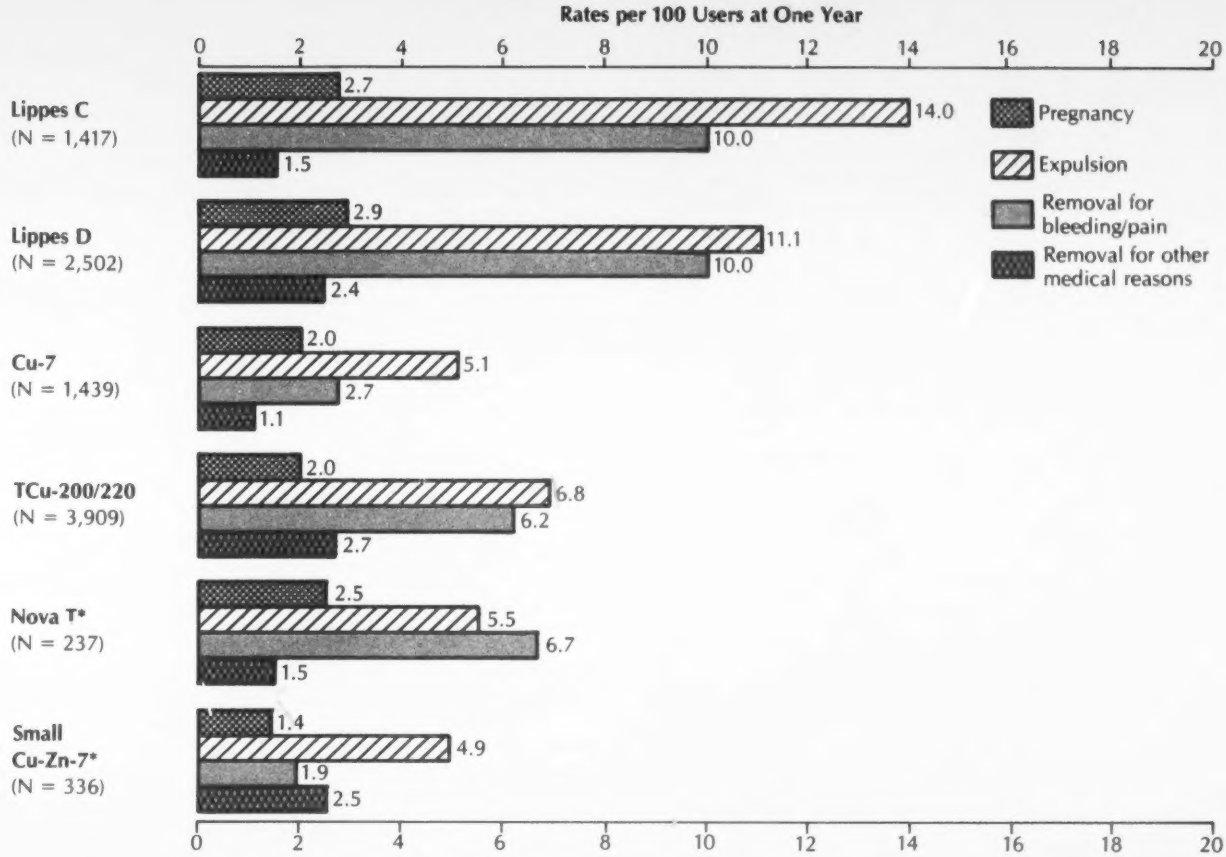
Meanwhile, data are being gathered by WHO in more than a dozen countries and by the Center for Population Research of the National Institutes of Health in the United States to investigate the extent to which IUD use may be associated with such serious conditions as uterine perforation, infection, ectopic pregnancy, or other gynecological and obstetric complications (338, 367). Results from these studies will be published beginning in 1979 and 1980.

Many observers believe that the development of unmedicated devices has gone as far as it can and that further efforts to produce new or improved configurations will not yield significant gains. Learning what pharmacologic agents to use, where on the device, in what quantities, with what release rates, and how long such medicated devices will remain fully effective now constitute a major element of IUD research.

Copper was the first active agent to be widely used. Zipper is experimenting with a copper-zinc combination which may effect electrolytic changes in the uterus (282), but most research with metals is focusing on the optimal amount and placement of copper. The TCu-200 and the Cu-7 are both licensed for marketing in the US with an approved lifetime of three years. The TCu-220C and the TCu-380A theoretically have longer life spans and the Population Council is gathering data to seek USFDA approval of the 380 for a longer period. A new version, tentatively called 380 Ag, includes 380 mg of copper wire with a silver core wrapped around the vertical arm of the T. The silver core is expected to prevent the copper from fragmenting and thus extend its life still further (271). A slightly different silver-cored copper wire device is now being manufactured in Finland as the Nova T (393) (see Table 20 and Figures 14-17).

In addition to copper, which acts primarily to enhance the existing contraceptive effect of the T- and 7-shaped devices, IUDs are also being used and tested as carriers for steroidal hormones. As recognized contraceptive agents, steroids within

Figure 6. One-year Gross Termination Rates per 100 Users, International Fertility Research Program Studies



*Single center trial

Note: Except for Nova T and small Cu-Zn-7, rates are adjusted for differences in age and parity among groups using different devices.

Source: International Fertility Research Program (114)

IUDs can be delivered locally in the uterus at substantially lower doses than required for oral administration and with minimal systemic side effects (219, 259). The Progestasert, developed by the Alza Corporation, is already in use. It contains a reservoir of 38 mg of progesterone in silicone oil and is approved by the USFDA with an effective life of one year. Alza is currently gathering data to extend this period to 18 months. A newer version manufactured in Mexico contains 52 mg of

Table 20. One-year First Segment Event Rates per 100 Users in Double Blind, Randomized, Multiclinic Comparisons of Copper Devices

	Sivin & Stern 1979 (278)				Jain 1975 (118)		Luukkainen et al. 1979 (167)	
	TCu-200	TCu-380A	TCu-200	TCu-220C	TCu-200	Cu-7	TCu-200	Nova T
Pregnancy	3.1	1.0	2.1	0.9	1.6	2.7	2.2	0.7
Expulsion	7.1	7.1	7.1	8.0	8.5	14.8	4.8	5.8
Removal								
Bleeding/Pain	11.5	14.2	10.3	11.5	8.1	10.2	13.9	12.3
Other Medical	2.8	3.0	3.6	2.3	3.3	4.0	4.8	4.6
Planning Pregnancy	2.2	2.4	0.9	1.9	1.5	1.7	2.1	2.9
Other Personal	2.4	2.4	3.4	1.9	2.7	1.8	0.4	1.2
Continuation	70.8	69.7	72.6	73.5	74.3	64.8	71.7	72.6
Insertions	1,851	1,679	1,014	1,097	1,775	1,762	936	907
Woman-months of Use	15,737	14,328	8,174	8,962	13,147	11,782	9,245	8.790

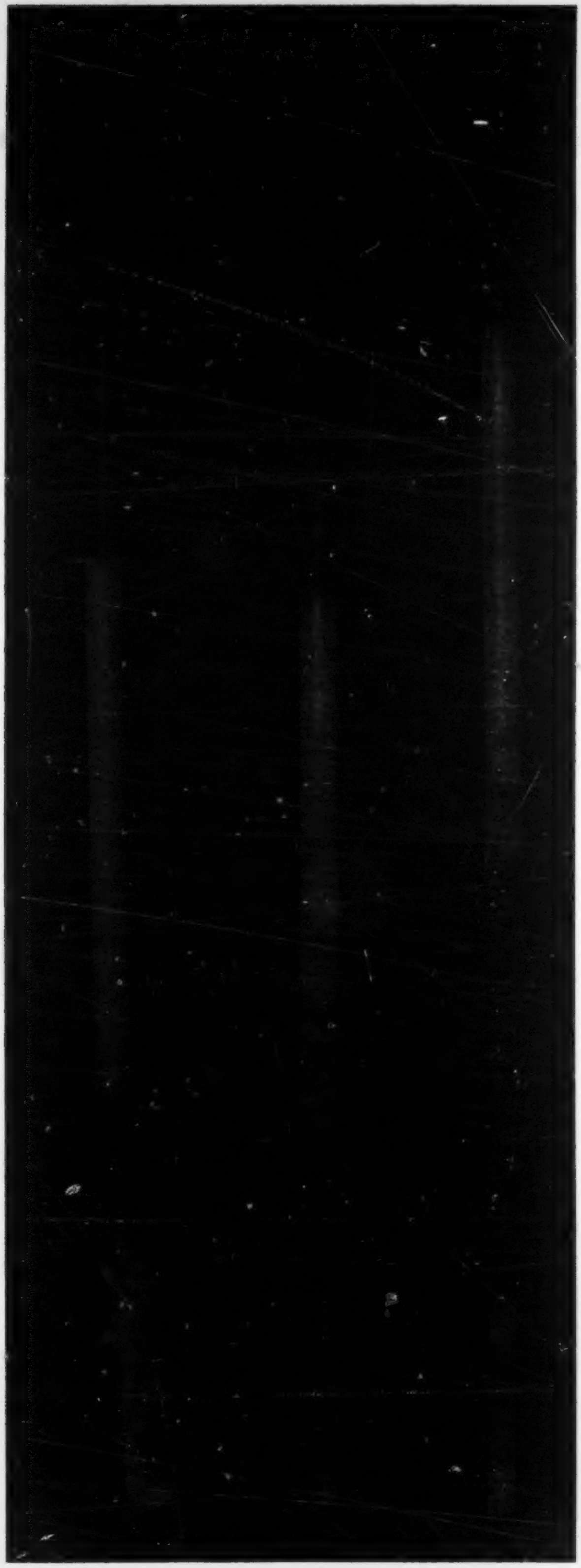


Figure 7. The Hasson Wing Sound permits precise measurements of the length of the uterine cavity from the internal os to the fundus separately from the length of the endocervical canal, thus making it possible for health care personnel to select and insert an IUD that exactly fits the uterine cavity and remains consistently above the cervix. (Photo courtesy of H.M. Hasson).

progesterone and is effective, according to Alza data, for three years. Other devices, believed to be effective for more than ten years, are also being tested (217).

The World Health Organization and the Population Council are both testing T-shaped devices that release levonorgestrel (formerly known as d-norgestrel), a synthetic progestin (168). The WHO device reportedly has a near constant release rate of 2 μg daily and an estimated minimum effective life span of 5 years, it is designed to produce a 40 to 60 percent reduction in menstrual blood loss (242). Clinical efficacy studies will begin in 1979 (242). The Population Council is testing devices with release rates of 10, 20, and 30 μg of levonorgestrel daily. Even these doses will not prevent ovulation but will act locally within the uterus (168, 191, 193, 194, 196). In these range-finding studies, Luukkainen will determine dose effects on bleeding control, suppression of the endometrium, and cervical mucus.

The Center for Population Research at the US National Institutes of Health is exploring possible use of an estrogen, estriol, on an intrauterine device. These studies have not yet reached the stage of clinical testing (338).

Another group of pharmacologic agents being added to IUDs are the fibrinolytic inhibitors tranexamic acid (AMCA) and epsilon aminocaproic acid (EACA). These synthetic amino acids have been used orally to reduce heavy menstrual bleeding (see p. B-66). M.I. Ragab and M.N. Thomas in Egypt showed that a U-Coil device releasing 4.3 μg of AMCA daily produced a removal rate for bleeding of 1.1 per 100 women as compared with 9.9 per 100 women with a U-Coil releasing copper (228). IFRP plans to support studies in a number of countries using trasylol- or AMCA-releasing devices to reduce bleeding (150).

Another important concern in current IUD research centers on the insertion process — measurement of uterine dimensions, selection of the appropriate size and shape device, and improved inserters, including those designed specifically for postpartum use. As M.F. Fathalla of Assiut University in Egypt points out:

> Marginal but significant advances in IUD performance can be achieved by improving either the insertion technique or the selection of patients. Too little effort has been spent on improving the inserter or on simplifying the insertion technique for use by paramedics and less experienced physicians. The development of a simple device to assess uterine size and configuration may go a long way in improving IUD performance, by screening out the potential problems (58).

H.M. Hasson has given special attention to the optimal size and shape of devices to fit the uterine cavity. He recommends an IUD design that (1) is shaped to remain stable in the fundus and resist downward force in the lower uterus; (2) avoids sharp edges or pointed tips that cause endometrial injury and bleeding; (3) combines transverse bend resilience with axial stiffness; and (4) is 1.25 to 1.75 cm smaller than the endometrial cavity. In a study of 319 women he found that combined pregnancy, expulsion, and medical removal rates were higher if the device was either too large, thus perforating or irritating uterine tissue, or too small, thus shifting position during uterine contractions (98, 99). Similarly, Ibrahim Kamal in Egypt has studied a large series of IUDs over long intervals using x-rays and a contrast medium to outline the uterus. His work too shows that pregnancies and side effects are more likely when the device fits the uterus poorly or does not cover the fundus adequately (132, 133, 206).

Some progress has been made in improving instrumentation for both uterine measurement and IUD insertion. The Hasson

Wing Sound, for example, provides a simple method of measuring the distance between the internal os and the fundus (99). Now being tested in Mexico is a Uterine Metrology Device developed by Battelle-Northwest for performing both lateral and longitudinal uterine measurements (47) (see Figures 7 and 8).

The Program for the Introduction and Adaptation of Contraceptive Technology (PIACT) through its Mexican affiliate, PIACT de Mexico, and IFRP are independently and jointly developing low-cost, reusable plastic inserters to be used with many IUD types. Intended especially for postpartum and postabortion insertions, the inserter is longer than the standard model. PIACT reports "encouraging" results in initial tests (47). The long inserter used by International Postpartum Program investigators in Thailand produced a 50 percent reduction in expulsion rates (20), but long inserters have not been distributed or marketed regularly for postpartum use (150, 240). IFRP is also testing insertion by hand, which can be performed immediately postpartum and may reduce perforation and expulsion (150). (See Figure 9.)

Developing and clinical testing of devices with biodegradable retentive components is designed to reduce expulsion following immediate postpartum and postabortion insertion. IFRP is testing modified T and Lippes Loop devices with chromic catgut sutures affixed to the upper arm of the device (see Figure 9). When the device is inserted, the free, clipped ends of the sutures act as tines and hold the device in place during uterine involution. The sutures are dissolved by body fluids and disappear within several weeks after immediate danger of expulsion has passed. In a four-center trial of this system including more than 300 insertions performed immediately after delivery of the placenta in Bangladesh, Cairo, Chile, and Manila, life table expulsion rates of 2.1 at one month and 5.3 at six months have been reported (150). Insertions were performed immediately after delivery yet the expulsion rates so far compare favorably with those for later or non-pregnancy-related insertions. If these results can be confirmed in larger studies, the device would be valuable in developing areas of the world where for many women the only occasion for visiting a clinic or hospital is at delivery.

While hopes remain high that some improvements can be made in IUD performance, especially by the addition of active agents or biodegradable materials, there is probably less expectation now than a decade ago that the device can be improved enough to meet the contraceptive needs of all women. The greatest technical challenge to IUD research and development lies in the fact that the important clinical parameters of IUDs are so interdependent that a design change to increase performance in one area will often result in decreased performance in other areas (137). For example, an increase in the surface area of an IUD can cause a substantial drop in the rate of accidental pregnancy, but at the same time it will probably increase the incidence of removals for bleeding and/or pain. An increase in stiffness will reduce expulsion but also increase the removal rate for bleeding and pain. Thus, while research carried out over the past 20 years has produced a great deal of knowledge about IUDs, it has not produced an ideal IUD that minimizes all clinical problems (360).

A second problem is that those who develop and test new IUDs in small clinical trials often report excellent results, but these results are not duplicated when the device is tested on a wider basis or in national programs. This may be the result of different definitions for events such as removals for bleeding and pain and removals for personal reasons. It may also reflect

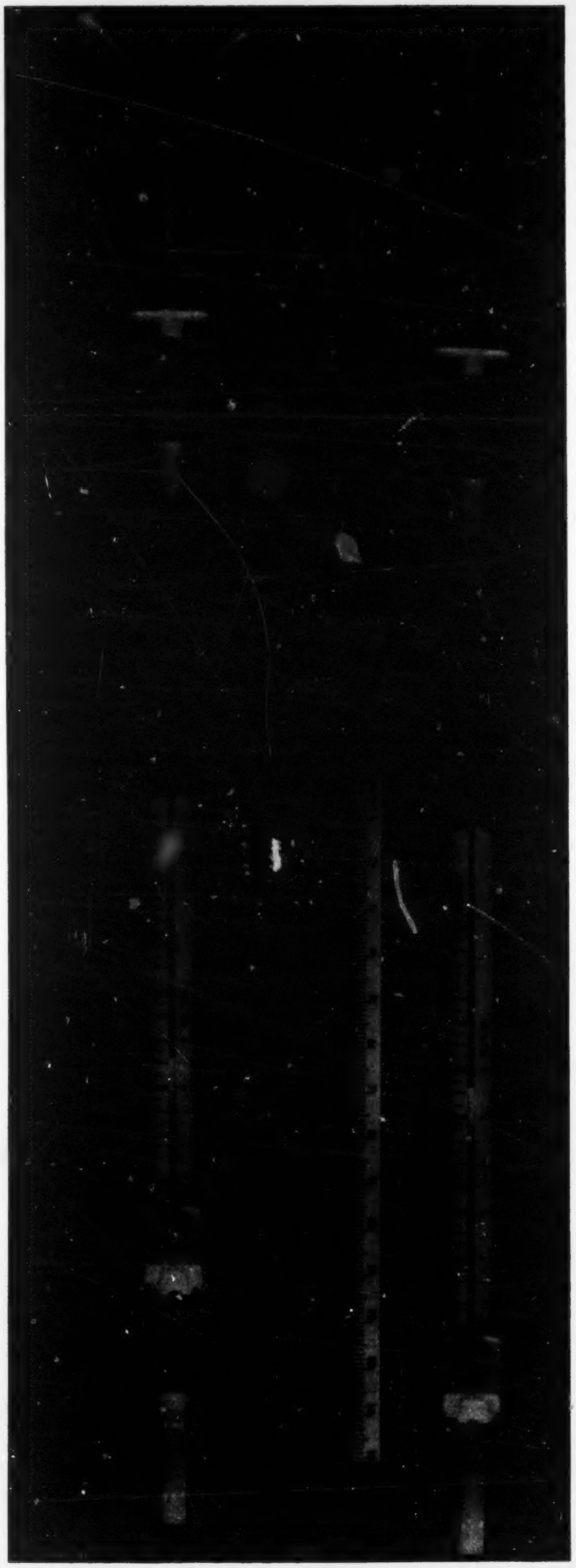


Figure 8. The Uterine Metrology Device, now in its initial experimental stages, permits measurements of uterine cavity depth and cervical canal length (right). By releasing the plastic wings at the tip of the device until they just touch the uterine walls (left), health care personnel can measure the lateral dimension of the uterine cavity as well.

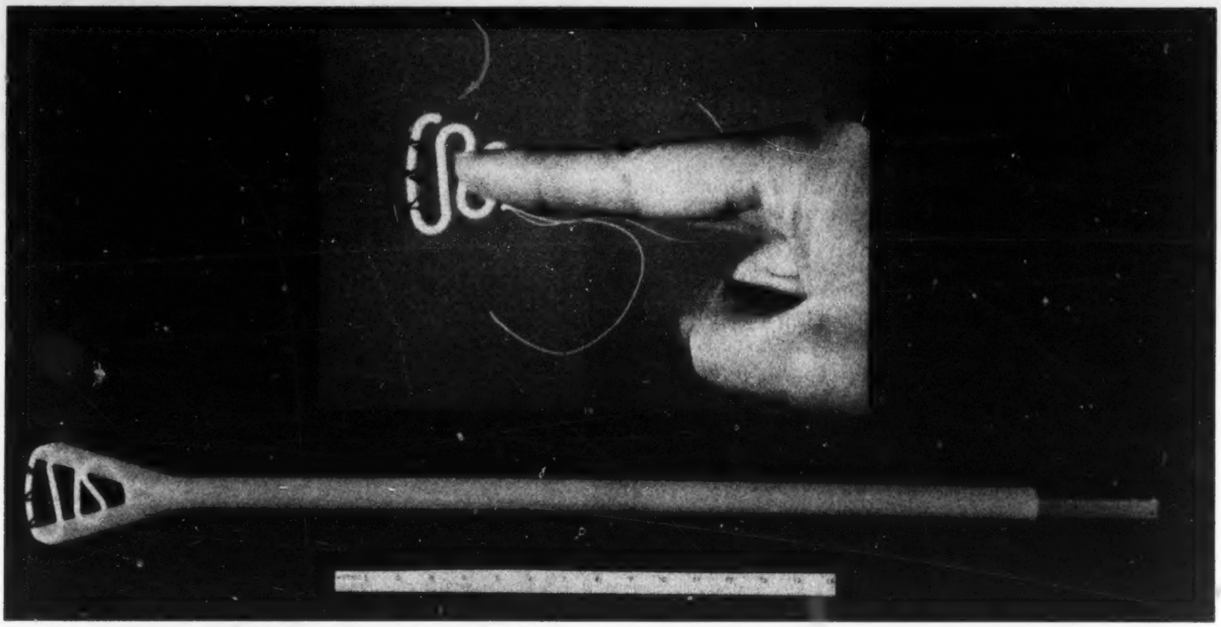


Figure 9. The International Fertility Research Program (IFRP) has modified the Lippes Loop for immediate postpartum insertion by adding projections of biodegradable No. 2 chromic sutures to the upper arm of the device. IFRP is also studying new inserters and hand insertion for early postpartum use.

greater time and individual attention given to users by the developer of a device than by other clinicians. Thus, a number of IUD configurations which showed promise in initial trials proved disappointing when tested in other countries or by other investigators.

A related difficulty in IUD studies is the effect of different program variables. As a result, some centers produce good results with almost any IUD configuration. Even where reporting is uniform and data are directly comparable, the performance of a given IUD varies considerably from one doctor or clinical center to another (26). These discrepancies may arise from differences in the populations evaluated, in the insertion procedures, or in counseling and following-up the women.

Developing and testing IUDs with active ingredients such as copper, zinc, or steroids raises still more research issues. Zipper and colleagues originally argued:

> A rational approach to the evaluation of pharmacologic agents would first include an independent assessment of the effects of the vector [carrier] and the effects of the agent. If on the basis of these tests the pharmacologic agent has the potential for improving IUD performance, then tests to evaluate the combined effects of the carrier and the pharmacologic agent would be conducted. If the effects of the carrier and the agent cannot be

Table 21. Approximate Prices of Selected IUDs for Commercial Sales and Public Sector Programs, 1979

Device	Manufacturer	Commercial Price	Public Sector Price
Lippes Loop D	Ortho USA	$50.54 box of 6	$29.22 box of 6 Overseas contact: local Johnson & Johnson affiliate. Prices depend on local conditions. Price to USAID: $36.00 for packages of 100 with 10 reusable inserters
	Finishing Enterprises Canada		Bulk only. Sliding scale of from $.75 each in boxes of 100 for less than 5,000 to $.08 each for 100,000 or more
Saf-T-Coil	Schmid USA	No bulk packaging; box of 6: $7 per unit	
Multiload	Multilan Switzerland	No bulk packaging; prices determined by local distributors, dependent on local conditions	
Cu-7	Searle USA	Individual packages only: $386.28 box of 30; $1,137.75 box of 100	
TCu-200	Outokumpu Oy Finland	$10-20 per unit	$.35 to $.90, depending on size of order; sterile, individual package
Progestasert	Alza USA	Lots of 6; 6 or 12 units: $18 per unit; 18-47 units: $16 per unit; 48 or more units: $14 per unit	Minimum order 48 units: $8.40 per unit

Source: PIACT (187)

> independently assessed, future research aimed at improving the performance of intrauterine contraceptive devices will necessarily be conducted on a trial and error basis (377).

Yet in fact the most widely used configuration for pharmacologic agents has been the T, which produced an unsatisfactory pregnancy rate of about 18 percent when tested without copper (308). Now trial and error testing must also determine not only the most adaptable plastic base to serve as a carrier, but also the most effective pharmacologic agents for various purposes, the appropriate dosage, form, position, and release rate as well as local and potential systemic side effects.

A further serious problem for the future will be costs. Whereas a simple plastic Lippes Loop can now be manufactured and sold in most countries in bulk at public sector prices ranging from \$0.08 to \$0.36 (see Table 21), the cost of medicated devices will be much higher. Copper-releasing devices range from \$0.35 to \$0.90 at the lowest available price for bulk supply. (Commercial prices for both unmedicated and copper devices are about ten times higher.) Progestin-releasing devices are more difficult to manufacture. The lowest public sector prices today are \$8.40 and the lowest commercial prices about twice that. Since the manufacture of medicated devices, especially those releasing a controlled measure of progestins, requires expensive, single-purpose equipment, local production will not be efficient for most countries. If the more sophisticated devices are going to be used extensively, a relatively small number of manufacturers will probably produce the world supply.

Finally, making the results of extensive IUD research programs available to health professionals, clinical centers, and national family planning programs will require a high degree of cooperation at the national and international levels. Research networks will need to share protocols and experience; data will have to be fully available and openly discussed; manufacture of devices will have to be arranged at convenient locations providing good quality control and reasonable prices; and finally distribution programs will have to provide adequate supplies and accurate clinical guidance on a large scale. The greatest challenges in IUD development today may be not only technical improvement of devices and clinical procedures but also efficient dissemination of improved devices and equipment to programs that need them.

IUD PHOTOGRAPHS AND INFORMATION

The IUDs in the following photographs are pictured actual size on square centimeter grids. Event rates from multicenter trials of many of these devices are reported in Table 11, p. B-57. Excluded from this section are several devices which were extensively tested but are no longer manufactured — the Majzlin Spring, the M, the Gynekoil, and the Dalkon Shield.

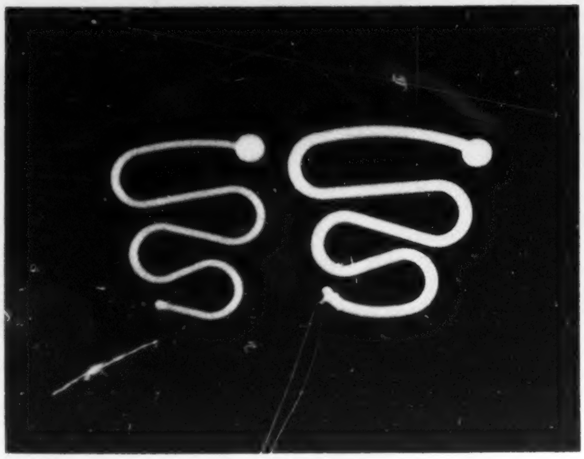


Figure 10. Lippes Loop

Description: One of the first of the modern IUDs and for years the standard, it is probably the most widely used IUD outside of China. Injection molded of alathon-20 polyethylene, it comes in four sizes, the smallest designated A (left), the largest, D (right). Incorporation of barium sulfate in the plastic made the Loop the first radiopaque IUD. With two nylon transcervical threads the Loop was also the first IUD to have a tail.

Developer: Jack Lippes (USA)

Date introduced: 1962

Distributor: Ortho Pharmaceutical Corporation, Raritan, New Jersey 08869, USA

Areas of major use: Worldwide

Inserter type: Push-out

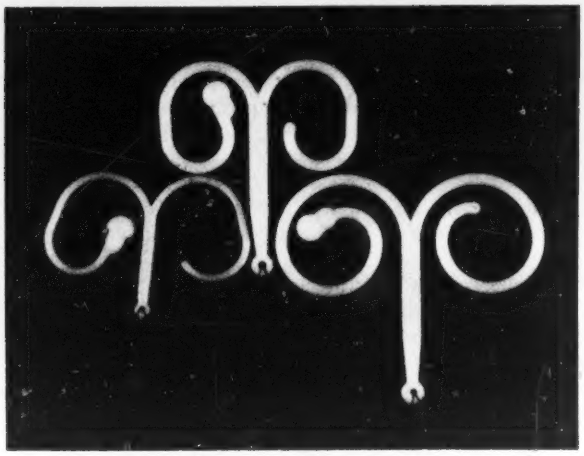


Figure 11. Saf-T-Coil

Description: Injection-molded of ethylene vinyl acetate copolymer with barium sulfate added for radiopacity, the Saf-T-Coil comes in three sizes, the 25-S (left), the 32-S (center), and the 33-S (right). The two transcervical monofilament threads are of nylon.

Developer: Ralph R. Robinson (USA)

Date introduced: 1965

Distributor: Schmid Laboratories, Inc., Little Falls, New Jersey 07424, USA

Areas of major use: Worldwide

Inserter type: Retract over plunger

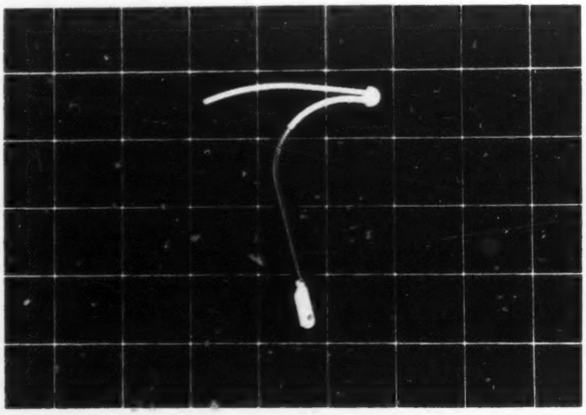


Figure 12. Cu-7, or Gravigard

Description: The Cu-7 obtains its contraceptive effect largely from the 200 sq mm surface area of copper in the form of a wire wrapped around the lower arm of the 7. It is injection-molded of polypropylene homopolymer with barium sulfate added for radiopacity, and it bears a single polypropylene thread. Its diameter is slightly less than the T's (28 mm versus 32 mm).

Developers: Jaime Zipper and Harvey Abramson (Chile)

Date introduced: 1974

Distributor: G. D. Searle & Co., Chicago, Illinois 60680, USA

USFDA-approved effective life: 3 years

Inserter type: Withdrawal

Areas of major use: Australia, Europe, Mexico, USA

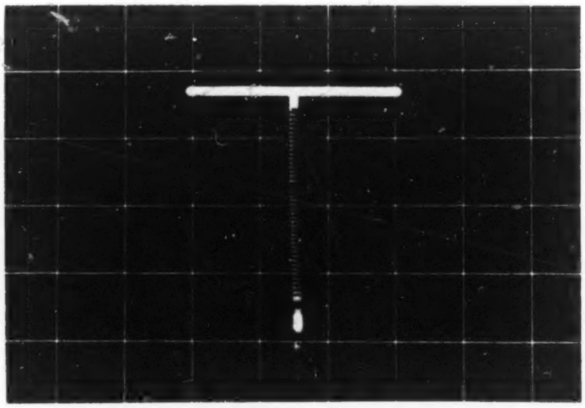


Figure 13. Copper T-200, or Gyne T

Description: Injection molded of polyethylene with barium sulfate added for radiopacity, this device was the first medicated IUD tested for contraceptive use. The fine copper wire wrapped about the vertical stem of the IUD exposes 200 sq mm of copper.

Developers: Howard Tatum (USA) and Jaime Zipper (Chile)

Date introduced: 1972

Distributors: AB Kabi, Stockholm, Sweden; G.D. Searle & Co. Chicago, USA (pending); Outokumpu Oy, Pori, Finland; Ortho Pharmaceutical Ltd., High Wycombe, England; Schering AG, Berlin, Federal Republic of Germany; Leiras, Turku, Finland

USFDA-approved effective life: 3 years

Inserter type: Withdrawal

Areas of major use: Worldwide

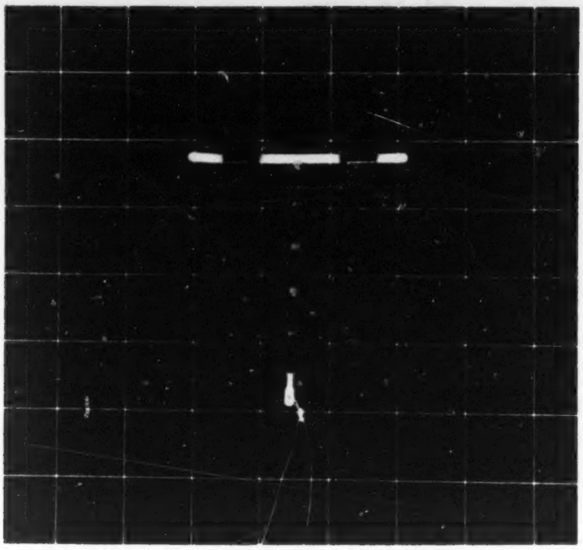


Figure 14. TCu-220

Description: An experimental, modified version of the copper T, the TCu-220 has seven solid copper sleeves, two on the transverse arm and five on the stem. With a total exposed copper surface of 220 sq mm, this device has a longer effective life than the TCu-200.

Developer: Population Council

Developer's estimate of effective life: 20 years

Inserter type: Withdrawal

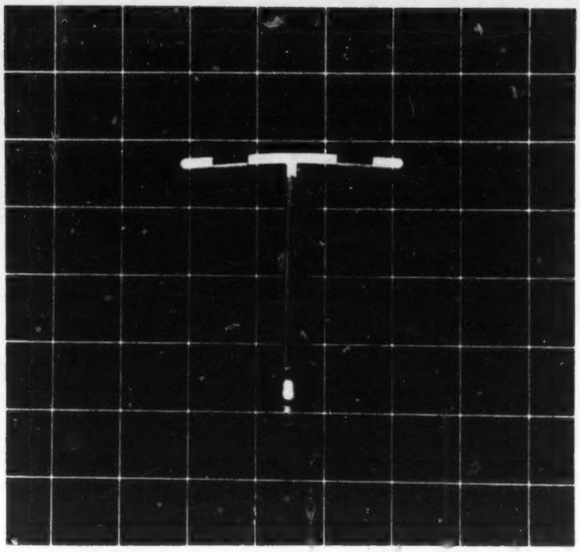


Figure 15. TCu-380 Ag

Description: The TCu-380 Ag carries two sleeves of solid copper on the crossbar and a coil of copper wire, with a core of silver, around the stem. The silver core is intended to keep the copper from fragmenting and so lengthen the effective life of the device. Total exposed copper surface is 380 sq mm. Two monofilament transcervical threads.

Developer: Population Council

Developer's estimate of effective life: 6-10 years

Inserter type: Withdrawal

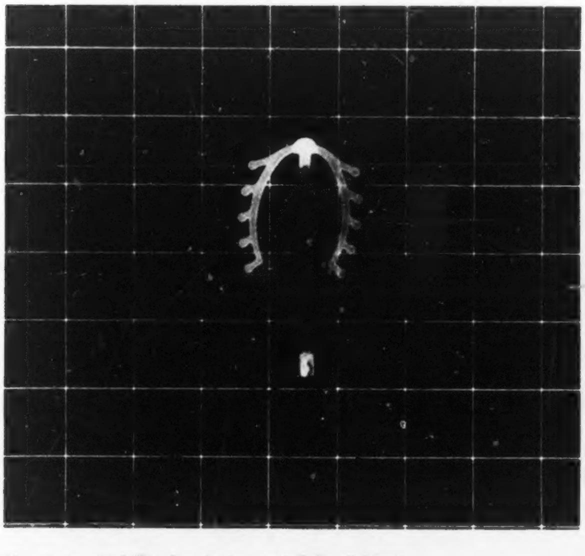


Figure 16. Multiload-cu250, or Multiload-D250

Description: A copper-releasing device with 250 sq mm of exposed copper in the form of wire wrapped around the vertical shaft. The arms are flexible plastic serrated fins that hold the device in place without stretching the uterine cavity. Specially designed inserter does not use a plunger.

Developer: W. A. A. van Os

Date introduced: 1974

Distributors: Multilan S. A., Fribourg, Switzerland; G. D. Searle Ltd. of Canada (pending); Desbergers Ltd., Montreal, Canada (pending)

Manufacturer's recommendation of effective life: 3 years

Inserter type: Withdrawal

Areas of major use: Europe, Canada (pending)

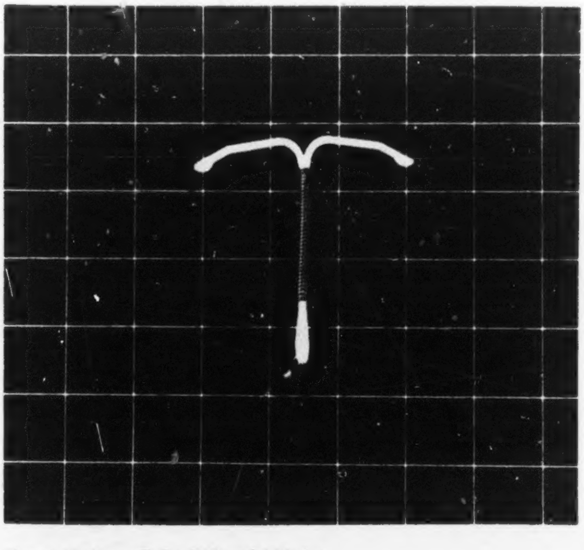


Figure 17. Nova T Cu-200 and 200 Ag

Description: Injection-molded of polyethylene with barium sulfate added for radiopacity. The fine copper wire wrapped about the vertical stem of the device exposes 200 sq mm of copper. A silver core has been added to the wire of the 200 Ag in order to reduce fragmentation.

Developers: Ahti Kosonen and Tapani Luukkainen (Finland)

Date Introduced: 1979

Distributors: Outokumpu Oy, Pori, Finland; Leiras, Turku, Finland: AB Kabi, Stockholm, Sweden; Schering AG, Berlin, Federal Republic of Germany

Manufacturer's recommendation of effective life: 3 years

Inserter type: Withdrawal

Areas of major use: Spain, Austria; pending: Denmark, Norway, Sweden, Switzerland, South Africa, United Kingdom

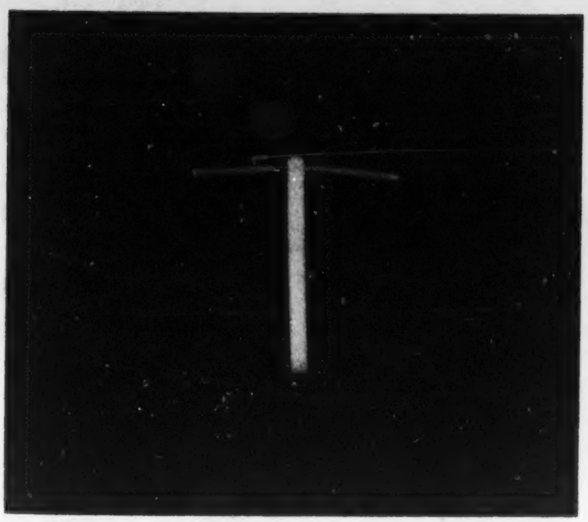


Figure 18. Progestasert Intrauterine (Progesterone) Contraceptive System

Description: Progesterone in silicone oil base is released to the uterus at a rate of 65 μg per day through the wall of the ethylene vinyl acetate copolymer vertical shaft. The reservoir in the shaft contains 38 mg of progesterone. The transverse arm is solid copolymer, and the device has two monofilament transcervical threads.

Developer: Alza Corporation (USA)

Date introduced: 1976

Distributor: Alza Corporation, Palo Alto, California 94304, USA

USFDA-approved effective life: One year

Inserter type: Automatic loading and modified withdrawal

Areas of major use: USA, Federal Republic of Germany, Italy

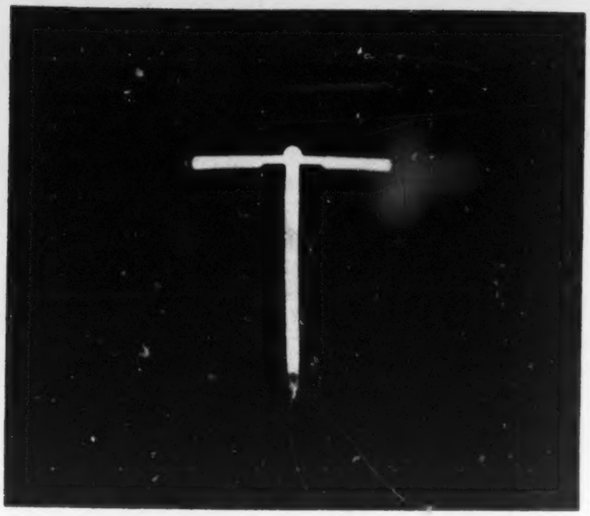


Figure 19. Uterine Therapeutic System

Description: Progesterone or levonorgestrel in polymeric base released into the uterus at a rate of 25 or 2-4 μg per day, respectively, through the wall of the ethylene vinyl acetate copolymer cross arms and vertical shaft. The device has two monofilament transcervical threads. WHO will conduct trials of this device.

Developer: Alza Corporation

Developer's estimate of effective life: 5 years

Inserter type: Automatic loading and modified withdrawal

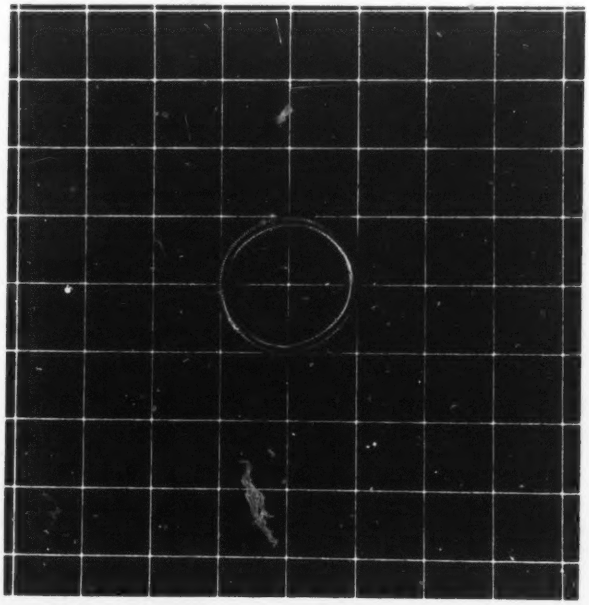


Figure 20. Chinese ring

Description: A ring of coiled stainless steel wire, this IUD is reportedly the first IUD a woman uses in China. The expulsion rate is said to be high; if it is expelled, it is replaced by the Shanghai V, shown in Figure 21. No transcervical threads.

Area of major use: People's Republic of China

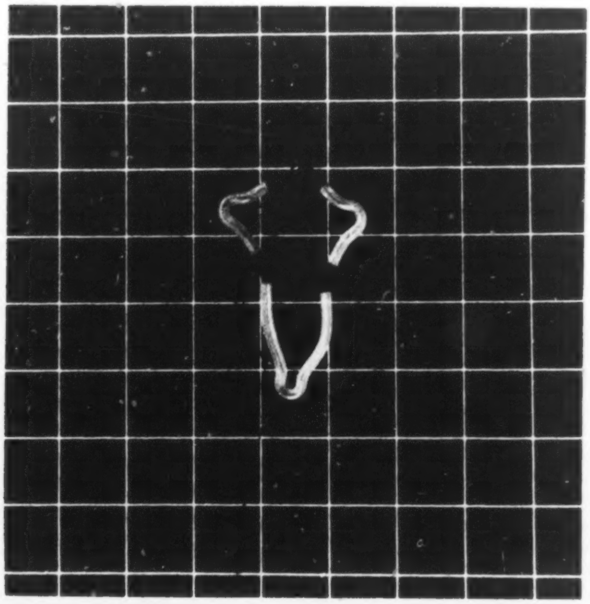


Figure 21. Chinese Shanghai V

Description: Used if the stainless steel ring is expelled, this device is said to remain in place better but to cause more bleeding and pain than the ring. It consists of what appears to be a stainless steel wire covered by a plastic sleeve except in four places where copper wire is wrapped about the stainless steel wire. The device has two monofilament plastic transcervical threads.

Area of major use: People's Republic of China

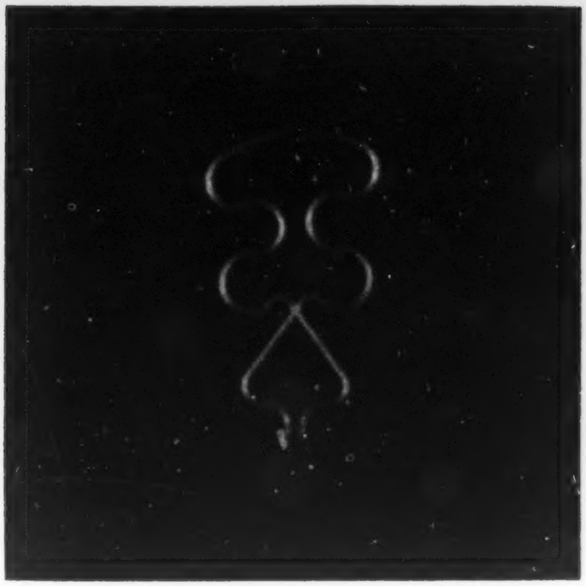


Figure 22. Dana Super

Description: Ethylene vinyl acetate with barium sulfate added for radiopacity. Two nylon cervical threads.

Distributor: State Textile Research Institute, Center for the Application of Radioactive Isotopes in the Textile Industry, Brno-Vaclavska 6, Czechoslovakia

Areas of major use: Eastern Europe, Vietnam

Type of Inserter: Push-out

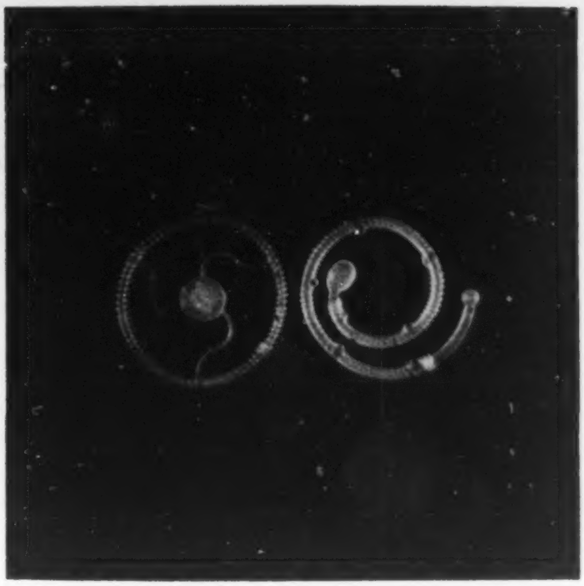


Figure 23. Ohta Ring

Description: A ring of polyethylene, incorporating barium sulfate for radiopacity. Several variants of this design have been produced in Japan, including, recently, a spiral device (right). Reportedly this latest model has not gained popularity, however. No transcervical threads.

Distributor: Ohta Rings, Kenkyu-sho, Tokyo, Japan

Areas of major use: Japan, Taiwan

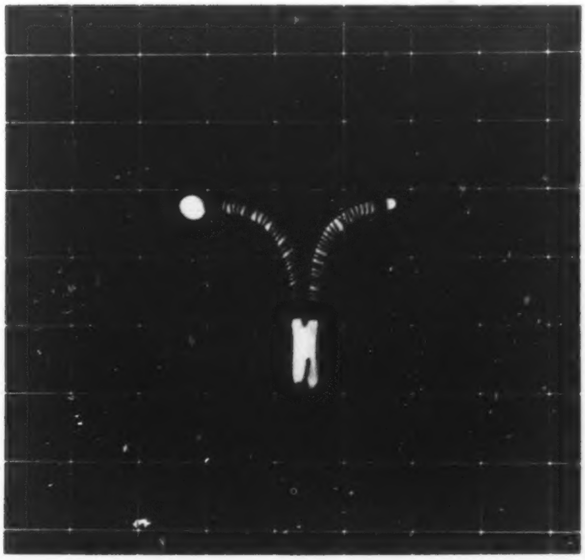


Figure 24. Soonawala Y

Description: A Y-shaped IUD with copper wound around its limbs exposing 250-300 sq mm of surface area. The end of one limb is bulbous to cover the tip of the inserter for ease of insertion.

Developer: R.P. Soonawala (India)

Date introduced: 1972

Developer's recommendation of effective life (preliminary): 4 years

Inserter type: Withdrawal

Area of major use: Bombay, India

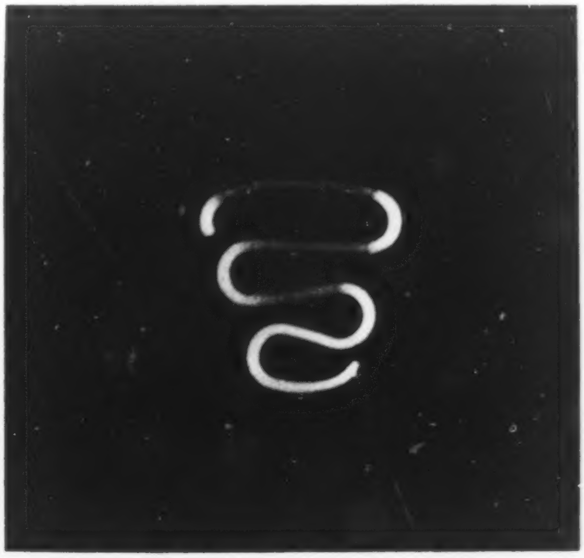


Figure 25. Modified Lippes Loop

Description: The arms of this Lippes Loop D have been coated with ethylene vinyl acetate carrying trasylol, a protease inhibitor, to reduce excessive bleeding. The drug is released at the rate of approximately 100 μg per day.

Developer: International Fertility Research Program

Table 3. Deliveries of IUDs (in Number of Units) Financed by the United States Agency for International Development, by Calendar Year and Area, 1968-1978

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	Total
AFRICA												
Benin	—	—	—	—	—	—	—	1,900	400	—	1,000	3,300
Botswana	—	—	—	3,200	—	—	—	5,000	—	—	—	8,200
Cameroon	—	—	—	—	—	—	—	—	—	—	10,000	10,000
Ethiopia	—	3,000	—	5,000	1,000	4,000	5,000	4,300	—	—	—	22,300
Gambia	—	—	—	1,300	1,000	1,000	1,300	4,750	—	—	—	9,350
Ghana	5,000	30,000	23,000	65,500	18,000	35,600	10,000	3,000	—	—	40,000	230,100
Kenya	1,000	50,000	30,000	—	30,000	22,000	13,000	7,750	12,100	—	—	165,850
Lesotho	—	—	—	—	—	2,200	100	800	—	—	—	3,100
Liberia	—	2,000	2,000	6,000	7,000	1,700	3,000	160,000	—	—	—	181,700
Morocco	—	—	—	—	30,000	—	56,000	1,000	—	29,000	—	116,000
Nigeria	—	35,000	—	6,300	35,000	30,100	23,000	11,000	—	—	—	140,400
Sierra Leone	400	—	4,000	1,000	5,000	6,000	2,000	8,500	2,000	—	—	28,900
Senegal	—	—	4,000	3,000	—	—	—	—	—	—	—	7,000
South Africa	—	—	—	—	—	5,000	—	—	—	—	—	5,000
Sudan	—	—	—	—	3,000	1,000	—	600	—	—	—	4,600
Tanzania	—	—	—	3,000	3,000	32,000	35,000	—	—	—	5,000	78,000
Tunisia	—	—	—	—	2,500	27,120	27,000	—	—	—	—	56,620
Uganda	—	—	2,000	2,760	5,000	4,000	10,000	—	—	—	—	23,760
Zaire	—	—	—	—	—	7,880	—	8,000	—	24,000	—	39,880
Zambia	—	—	—	—	—	2,600	—	2,250	2,000	—	—	6,850
Subtotal	6,400	120,000	65,000	97,060	140,500	182,200	185,400	218,850	16,500	53,000	56,000	1,140,910
ASIA												
Afghanistan	—	10,000	10,000	—	—	5,000	—	—	—	4,000	—	29,000
Bangladesh	—	—	—	—	800	—	201,000	—	200,000	—	—	401,800
Egypt	—	—	—	—	—	—	1,000	50,000	130,000	—	—	181,000
Fiji	—	—	5,000	—	—	—	1,000	—	—	—	—	6,000
Hong Kong	—	—	—	19,904	10,000	—	13,000	6,000	—	—	—	48,904
Indonesia	10,000	—	—	—	100,000	20,000	97,000	—	—	—	220,000	447,000
Iran	—	—	—	—	—	500	2,000	100	700	—	—	3,300
Iraq	—	—	—	—	—	3,500	8,000	5,000	500	—	—	17,000
Israel	—	—	—	—	—	—	1,000	2,000	—	—	—	3,000
Jordan	—	—	—	—	—	5,000	—	2,000	—	—	—	7,000
Laos	—	—	5,000	10,000	12,000	5,500	10,000	—	—	—	—	42,500
Lebanon	—	—	—	35,000	—	—	2,000	2,500	—	—	—	39,500
Malaysia	—	—	1,000	21,000	5,600	2,000	12,000	1,900	—	—	—	43,500
Nepal	1,000	—	—	—	10,000	—	1,500	—	8,000	—	9,000	29,500
Pakistan	—	—	—	—	4,000	2,500	5,000	10,000	—	—	—	21,500
Philippines	—	35,000	90,000	100,000	95,500	293,456	25,000	96,000	—	—	—	734,956
Ryukyu Islands	—	—	—	—	4,800	—	—	—	—	—	—	4,800
Singapore	800	16,300	—	—	—	—	—	—	—	—	—	17,100
Sri Lanka	5,000	10,000	—	—	1,000	7,000	8,000	—	—	—	—	31,000
Syria	—	—	—	—	—	—	—	—	8,000	—	—	8,000
Thailand	—	—	—	—	—	—	—	1,000	—	—	—	1,000
Turkey	—	—	—	—	—	—	—	—	43,000	—	—	43,000
Vietnam	—	—	—	—	—	—	60,100	—	—	—	—	60,100
Subtotal	16,800	71,300	111,000	185,904	243,700	344,456	447,600	176,500	390,200	4,000	229,000	2,220,460
WESTERN HEMISPHERE												
Argentina	8,000	—	20,000	12,000	11,000	21,000	—	—	—	—	—	72,000
Bolivia	2,000	—	—	—	—	—	—	—	—	—	—	2,000
Colombia	5,000	—	40,000	80,000	100,000	100,000	45,000	70,000	—	—	—	440,000
Chile	—	5,000	80,500	15,000	23,000	30,000	30,000	21,000	—	50,000	—	254,500
Costa Rica	10,500	—	25,000	—	10,000	17,000	9,000	2,000	—	—	—	73,500
Curacao	—	3,000	—	200	—	—	—	1,200	300	—	—	4,700
Dominican Rep.	4,000	2,000	—	—	16,000	—	—	—	—	—	—	22,000
Ecuador	15,000	5,000	20,000	22,000	6,000	—	—	40,000	—	—	—	108,000
El Salvador	12,000	—	—	—	2,500	23,040	26,000	—	1,200	—	5,002	69,742
Guatemala	10,000	7,500	10,000	30,000	3,000	—	9,000	—	—	—	—	69,500
Honduras	1,000	—	—	20,000	5,000	5,000	3,000	2,500	—	—	—	36,500
Jamaica	1,000	—	1,000	1,000	—	22,000	—	2,000	2,400	13,200	—	42,600
Leeward Islands	2,000	—	—	200	1,300	1,100	700	2,800	—	—	—	8,100
Mexico	3,000	—	—	—	—	—	—	—	—	—	—	3,000
Nicaragua	—	—	—	—	—	50,000	50,000	10,000	1,600	—	—	111,600
Panama	5,000	—	6,000	6,500	35,400	—	—	—	25,000	—	—	77,900

Table 3 (Continued)

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	Total
Paraguay	5,000	—	6,500	19,500	22,500	36,500	25,000	24,000	600	—	—	139,600
Peru	—	—	10,000	10,000	5,000	25,000	—	—	—	—	—	50,000
Surinam	—	1,000	—	—	—	500	3,000	1,000	—	—	—	5,500
Trinidad	—	2,000	—	—	—	—	5,000	—	—	—	—	7,000
Uruguay	1,000	—	15,000	—	2,000	—	—	5,800	—	—	500	24,300
Venezuela	5,500	5,000	60,000	7,500	77,000	126,000	78,000	38,000	—	—	—	397,000
Windward Islands	7,000	—	3,000	—	1,900	4,000	900	600	—	—	—	17,400
Subtotal	97,000	30,500	297,000	223,900	321,600	461,140	284,600	220,900	31,100	63,200	5,502	2,036,442
Country NA	47,500	17,500	397,500	530,000	461,000	425,200	439,700	209,000	250,500	589,500	342,000	3,798,400
TOTAL	167,700	239,300	870,500	1,036,864	1,166,800	1,412,996	1,357,300	914,250	688,300	709,700	632,502	9,196,212

Source: USAID, Office of Population (331)

Table 4. Purchases of Intrauterine Devices by United Nations Children's Fund Financed by the United Nations Fund for Population Activities, by Calendar Year, 1974-1978

	1974	1975	1976	1977	1978
AFRICA					
Algeria		4,080*	1,000		24,195
Cape Verde Isl.					8,000
Egypt					125,000
Mali				3,900	56,820
Mauritius		300*			
Nigeria			11,000	3,500	
Swaziland			5,000	500	1,000
Tunisia	5,000	70,000*	90,000	160,000	
Turkey			25,000		
Subtotal	5,000	74,380	132,000	167,900	215,015
ASIA					
Bangladesh					1,000
Fiji				2,400	
India		1,000,000			
Jordan				5,500	
Malaysia		1,600			
Pakistan					105,000
Pacific Isl.					2,600
Singapore	300	850	500		
Thailand				40,000	300,000
Tonga		1,600*			
Vietnam					551,020
Subtotal	300	1,004,050	500	47,900	959,620
WESTERN HEMISPHERE					
Chile		102,100	591,000		
Cuba		190,000		69,000	381,000
Jamaica					
Mexico		61,000*			
Paraguay			4,000		
Venezuela					220,000
Subtotal		353,100	595,000	67,000	601,000
TOTAL	5,300	1,431,530	727,500	282,800	1,775,635

*Including TCu-200s drawn from stockpile

Source: Badham, UNFPA (19)

Table 5. Purchases of Intrauterine Devices by World Health Organization Financed by the United Nations Fund for Population Activities, by Calendar Year, 1976-1978

	1976	1977	1978
AFRICA			
Lesotho			500
Sudan	9,000		11,710
Togo			25,000
Subtotal	9,000		37,210
ASIA			
Cook Islands	1,600	600	600
Jordan			6,000
Mongolia			1,350
Papua-New Guinea	12,300		
Solomon Islands	3,000		
Syria	5,000		3,000
Tonga	500	500	500
Western Samoa			100
Yemen, People's Democratic Republic	28,000		1,000
Yemen, Arab Republic	3,150		
Subtotal	53,550	1,100	12,500
TOTAL	62,550	1,100	49,760

Source: Badham, UNFPA (19)

Table 6. Deliveries of IUDs Financed by the Swedish International Development Authority, by Type and Area, 1967-1978

(Number of Units)

	Lippes Loop	Saf-T-Coil	Dana Super	Copper T	Cu-7	Other
AFRICA						
Algeria	1,000 (1969)	900 (1969) 600 (1972)				
Ethiopia				500 (1972)		
Kenya	50,000 (1970) 13,000 (1975) 37,000 (1976) 150,000 (1977)			1,000 (1976)		
Subtotal	251,000	1,500		1,500		
ASIA						
Malaysia						7,500 (1974)
Sri Lanka	10,100 (1967) 140,000 (1973) 120,000 (1975) 290,000 (1976) 350,000 (1977)			1,000 (1975) 25,000 (1978)		
Thailand		10,000 (1971)				
Vietnam	5,000 (1973) 10,500 (1976)	400 (1974)	10,000 (1971) 100,000 (1972) 100,000 (1973) 300,000 (1974) 450,000 (1975) 650,000 (1976) 1,390,000 (1977)	450 (1974) 5,000 (1976) 5,000 (1977)	1,000 (1976) 1,000 (1977)	860 (1974)
Subtotal	925,600	10,400	3,000,000	36,450	2,000	8,360
WESTERN HEMISPHERE						
Cuba	29,000 (1975) 600,000 (1977)	50,000 (1972)				
Subtotal	629,000	50,000				
TOTAL	1,805,600	61,900	3,000,000	37,950	2,000	8,360

Source: Swedish International Development Authority (304)

Table 9. New Acceptors of IUDs in 22 Countries with National Family Planning Programs, 1968-77

Country and Year	Total Acceptors (Thousands)	Acceptors of IUDs (Thousands)	Acceptors of IUDs as Percent of Total Acceptors
AFRICA			
Egypt			
1968	134.0	47.0	35.0
1970	206.0	57.0	27.6
1972	237.0	85.0	35.8
1974	143.0	66.0	46.1
1976	187.0	84.0	44.9
1977	—	95.0	—
Ghana			
1972	30.5	3.2	10.4
1974	34.2	2.8	8.1
1976	32.0	2.8	8.7
1977	33.5	2.7	8.0
Kenya			
1968	8.8	3.7	42.0
1970	30.9	18.1	58.5
1972	43.0	4.7	10.9
1974	49.2	4.6	9.3
1976	61.2	7.1	11.6
1977	71.4	10.1	14.1
Morocco			
1968	8.5	7.5	88.2
1970	22.8	9.8	42.9
1972	27.5	6.3	22.9
1974	55.4	6.3	11.4
1976	78.0	6.2	8.0
Tunisia			
1974	50.9	19.1	37.5
1976	73.5	20.8	28.2
ASIA			
Afghanistan			
1974	11.0	1.1	10.0
1976	16.6	1.2	7.2
Bangladesh			
1972	142.5	8.5	5.9
1974	187.8	31.9	16.9
1976	1,103.1	77.9	7.0
1977	903.8	44.5	4.9

Table 9 (Continued)

Country and Year	Total Acceptors (Thousands)	Acceptors of IUDs (Thousands)	Acceptors of IUDs as Percent of Total Acceptors
India[1]			
1968	3,115.0	479.0	15.3
1970	3,782.0	476.0	12.5
1972	5,899.0	355.0	6.0
1974	4,406.0	443.0	10.0
1976	12,806.0	580.0	4.5
1977	4,714.0	317.0	6.8
Indonesia[1]			
1968	25.1	13.8	54.9
1970	181.1	76.4	42.1
1972	1,079.0	380.0	35.2
1974	1,593.0	187.0	11.7
1976	2,213.0	400.0	18.0
1977	2,246.0	366.0	16.3
Iran			
1972	445.0	19.0	4.2
1974	481.0	19.4	4.0
1976	572.0	25.4	4.4
1977	621.0	16.7	2.7
Malaysia, Peninsular			
1968	70.4	1.2	1.7
1970	56.0	0.8	1.4
1972	56.4	1.1	1.9
1974	61.7	0.8	1.2
1976	75.2	1.1	1.4
1977	80.4	1.1	1.1
Nepal			
1972	50.6	1.2	2.3
1974	104.4	1.1	1.0
1976	138.8	1.6	1.1
Pakistan			
1972	—	136.1	—
1974	—	112.5	—
1975	2,086.0	189.0	9.0
Philippines			
1972	622.0	83.0	13.3
1974	747.0	77.1	10.3
1976	647.0	43.3	6.7
1977	509.0	41.5	8.1
Taiwan[2]			
1968	122.9	101.4	82.5
1970	160.2	97.4	60.7
1972	272.0	152.0	55.8
1974	284.0	157.0	55.2
1976	325.0	181.0	55.6
1977	338.0	177.0	52.4
Thailand[3]			
1968	51.6	35.3	68.4
1970	202.9	74.4	36.6
1972	384.0	90.1	23.4
1974	404.0	73.6	18.2
1976	533.0	59.0	11.1
1977	644.0	61.3	9.5
WESTERN HEMISPHERE			
Colombia[4]			
1968	49.6	32.3	65.1
1970	125.0	73.0	58.4
1972	80.4	—	—
1974	171.8	63.6	37.0
1976	156.7	55.9	35.7
1977	142.1	52.7	37.1
Costa Rica			
1968	10.0	2.8	28.0
1970	12.7	1.8	14.1
1972	26.7	2.4	8.9
1974	25.7	1.9	7.3
1976	28.8	1.6	5.5
1977	22.6	0.4	1.8
Dominican Republic			
1968	3.6	1.4	38.8
1970	17.2	7.0	40.6
1972	18.7	5.7	30.4
1974	38.1	6.4	16.7
1976	61.5	6.0	9.7
1977	88.9	5.9	6.6
Ecuador			
1968	3.1	1.5	48.3
1970	5.5	2.6	47.2
1972	17.4	8.3	47.7
1974	35.2	14.4	40.9
1976	32.3	11.3	34.9
El Salvador			
1972	36.8	—	—
1974	41.3	7.6	18.4
1976	56.0	8.2	14.6
1977	51.3	7.4	14.4
Mexico[5]			
1968	10.7	4.2	39.2
1970	25.1	8.5	33.8
1972	45.0	14.0	31.1
1974	541.0	285.0	52.6
1975	608.0	297.0	48.8
1977	845.7	—	—

[1] India, Indonesia — data for 1968, 1970 include postpartum program acceptors; data are for fiscal year beginning April 1 of indicated year.

[2] Taiwan — data for 1972-1976; approximately one-third represent acceptors of reinsertion.

[3] Thailand — data for 1968, 1970 include postpartum program acceptors; annual totals exclude an estimated 16 percent duplication of acceptors by method. The increase in 1974 over 1972 acceptors results largely from the inclusion of acceptors in selected private sector service centers that have joined the government's reporting system.

[4] Columbia — data for 1968, 1970 include postpartum program acceptors; subsequent years data represent latest estimate.

[5] Mexico — data for 1968, 1970 include postpartum program acceptors and acceptors in private clinics now part of national program; data for 1974 relate to acceptors of contraceptives in the governmental facilities as well as in the Foundation for Population Studies (FEPAC), an IPPF affiliate. For all other years, data relate to FEPAC only. For 1977 FEPAC contraceptive acceptors totaled 49,900; of that total, 8,300 accepted IUDs.

Source: Nortman & Hofstatter (203, 204)

BIBLIOGRAPHY

1. ANONYMOUS. Contraception in Europe. IPPF Europe Regional Information Bulletin 8(1): 1-2. January 1979.

2. ANONYMOUS. Doctors and devices. People 5(1): 37. 1978.

3. ANONYMOUS. Indonesia village programs stress pill continuation while medical clinics start women on method use. International Family Planning Digest 2(3): 3-5. September 1976.

4. ANONYMOUS. Intrauterine devices will carry PID risk warning. Ob. Gyn. News 13(17): 2. September 1, 1978.

5. ANONYMOUS. IUDs and heavy periods. [Editorial] British Medical Journal 1(6005): 304. February 7, 1976.

6. ANONYMOUS. Less menstrual blood loss with Progestasert. Ob. Gyn. News 12(4): 13. February 15, 1977.

7. ANONYMOUS. The nulliparous patient, the IUD, and subsequent fertility. British Medical Journal 2(6132): 233. July 22, 1978.

8. ANONYMOUS. The pill and the poor. People 5(1): 36. 1978.

9. ANONYMOUS. Salpingitis, sometimes iatrogenic, called serious threat to fertility. Ob. Gyn. News 12(18): 1, 17. September 15, 1977.

10. ADLI, A.G. and BEROUKHIM, F. A study on the long-term effect of intrauterine contraceptive device. Wisconsin Medical Journal 73: S61-S62. May 1974.

11. AKINLA, O., LUUKKAINEN, T., and TIMONEN, H. Important factors in the use-effectiveness of the copper-T-200 IUD. Contraception 12(6): 697-707. December 1975.

12. ALVIOR, G.T., Jr. Pregnancy outcome with removal of intrauterine device. Obstetrics and Gynecology 41(6): 894-896. June 1973.

13. ALZA PHARMACEUTICALS. The Progestasert: intrauterine progesterone contraceptive system; release rated 65μg/day progesterone for one year: a new contraceptive. Palo Alto, California, Alza Corporation, May 1976. 62 p.

14. AMERICAN COLLEGE OF OBSTETRICIANS AND GYNECOLOGISTS. The intrauterine device. ACOG Technical Bulletin, No. 40, June 1976. 4 p.

15. ANDERSON, A.B.M., HAYNES, P.J., GUILLEBAUD, J., and TURNBULL, A.C. Reduction of menstrual blood-loss by prostaglandin-synthetase inhibitors. Lancet 1(7963): 774-776. April 10, 1976.

16. ANDOLŠEK, L. Experience with immediate post-abortion insertions of the IUD. In: Lewit, S., ed. Abortion techniques and services. (Proceedings of the Conference, New York, June 3-5, 1971) Amsterdam, Excerpta Medica, 1972. (International Congress Series 255) p. 63-67.

17. ÅSTEDT, B. and LIEDHOLM, P. IUDs and fibrinolysis. [Letter] British Medical Journal 1(6016): 1017. April 24, 1976.

18. AZNAR, R., BERRY, C.L., COOKE, I.D., CUADROS, A., GRAY, R., McNICOL, G.P., NEWTON, J.R., PIZARRO, E., ROWE, P.J., SHAW, S.T., Jr., WAGATSUMA, T., WEBB, F., and WILSON, E. Ectopic pregnancy rates in IUD users. [Letter] British Medical Journal 1(6115): 785-786. March 25, 1978.

19. BADHAM, D.R. [UN Fund for Population Activities] [IUD purchases] Personal communication, March 23, 1979. 8 p.

20. BANHARNSUPAWAT, L. and ROSENFIELD, A.G. Immediate postpartum IUD insertion. Obstetrics and Gynecology 38(2): 276-285. August 1971.

21. BARRON, B.A., WEINSTEIN, H., and RICHART, R.M. An investigation of the effects of the intratuerine contraceptive device based on a longitudinal study of a self-selected sample of Barbadian women. American Journal of Obstetrics and Gynecology 124(7): 723-729. April 1, 1976.

22. BATÁR, I. and THOMAS, M.N. One year's experience with the Ypsilon-Y IUD. International Journal of Obstetrics and Gynaecology 16(4): 333-338. January-February 1979.

23. BERAL, V. An epidemiological study of recent trends in ectopic pregnancy. British Journal of Obstetrics and Gynaecology 82: 775-782. October 1975.

24. BERGSJØ, P., LANGENGEN, H., and AAS, J. Tubal pregnancies in women using progestagen-only contraception. Acta Obstetricia et Gynecologica Scandinavica 53(4): 377-378. 1974.

25. BERNARD, R.P. Factors governing IUD performance. American Journal of Public Health 61(3): 559-567. March 1971.

26. BERNARD, R.P. I.U.D. performance patterns: a 1970 world view. International Journal of Gynaecology and Obstetrics 8(6, Pt. 2): 926-940. November 1970.

27. BONNAR, J. Progestagen-only contraception and tubal pregnancies. [Letter] British Medical Journal 1(5902): 287. February 16, 1974.

28. BONNEY, W.A., Jr., GLASSER, S.R., CLEWE, T.H., NOYES, R.W., and COOPER, C.L. Endometrial response to the intrauterine device. American Journal of Obstetrics and Gynecology 96(1): 101-113. September 1, 1966.

29. BRENNER, P.F. and MISHELL, D.R., Jr. Progesterone and estradiol patterns in women using an intrauterine contraceptive device. Obstetrics and Gynecology 46(4): 456-459. October 1975.

30. BURNHILL, M.S. Prescriptive approaches to IUD usage. In: Wheeler, R.G., Duncan, G.W., and Speidel, J.J., eds. Intrauterine devices: development, evaluation, and program implementation. [Proceedings of a Workshop on Advances in IUDs, Battelle Seattle Research Center, Seattle, Washington, October 18-20, 1973] New York, Academic Press, 1974. p. 79-89.

31. CALLENDAR, S.T., WARNER, G.T., and COPE, E. Treatment of menorrhagia with tranexamic acid: a double-blind trial. British Medical Journal 4(5729): 214-216. October 24, 1970.

32. CAMP, S.L. Journal notes from the second visit of family planning professionals to the People's Republic of China, November 1-22, 1978. 30 p. (Unpublished)

33. CATES, W., Jr., ORY, H.W., ROCHAT, R.W., and TYLER, C.W., Jr. The intrauterine device and deaths from spontaneous abortion. New England Journal of Medicine 295(21): 1155-1159. November 18, 1976.

34. CERDINO, A. Family planning courses for nurses and midwives in the Philippines. IPPF Medical Bulletin 12(5): October 1978. p. 1.

35. CHAUDHURI, G. Influence of indomethacin, an inhibitor of prostaglandin synthesis, on IUD-mediated increase in motility and hypertrophy of the rat uterine horn. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 477-480.

36. CHOW, A.W., MALKASIAN, K.L., MARSHALL, J.R., and GUZE, L.B. The bacteriology of acute pelvic inflammatory disease: value of cul-de-sac cultures and relative importance of gonococci and other aerobic or anaerobic bacteria. American Journal of Obstetrics and Gynecology 122(7): 876-879. August 1, 1975.

37. CHRISTIAN, C.D. The intrauterine device. Journal of Reproductive Medicine 21(5, Suppl.): 252-253. November 1978.

38. CHRISTIAN, C.D. Maternal deaths associated with an intrauterine device. American Journal of Obstetrics and Gynecology 119(4): 441-444. June 15, 1974.

39. CHRISTIAN, C.D. The morbidity and mortality of mid-trimester sepsis associated with IUDs. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 429-430.

40. COMBINED BANGKOK HOSPITAL GROUP and WRIGHT, N.H. Unsuspected pelvic infection discovered at tubal ligation: relationship to use of intrauterine contraception. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 401-409.

41. CORSA, L. Seeing the flowers from a flying horse: personal report of a trip to China, 30 October-21 November 1978. (Unpublished)

42. CUCA, R. and PIERCE, C.S. Korea. In: Cuca, R. and Pierce, C.S. Experiments in family planning: lessons from the developing world. Baltimore, Maryland, Johns Hopkins University Press, 1977. p. 164-183.

43. CURLIN, P., KHAN, M., and CHOUDHURY, S. Household distribution of contraceptives in Bangladesh: the urban experience. In: Gardner, J.S., Mertaugh, M.T., Micklin, M., and Duncan, G.W., eds. Village and household availability of contraceptives: Africa/West Asia. Seattle, Washington, Battelle Memorial Institute, Human Affairs Research Centers, [1977]. p. 231-250.

44. DAVIS, H.J. Intrauterine devices of contraception: the IUD. Baltimore, Maryland, Williams and Wilkins, 1971. 210 p.

45. DAVIS, H.J. and LESINSKI, H. Uterine variables in IUD design. In: Wheeler, R.G., Duncan, G.W., and Speidel, J.J., eds. Intrauterine devices: development, evaluation, and program implementation. [Proceedings of a Workshop on Advances in IUDs, Battelle Seattle Research Center, Seattle, Washington, October 18-20, 1973] New York, Academic Press, 1974. p. 91-97.

46. DREISHPOON, I.H. Complications of pregnancy with an intrauterine contraceptive device in situ. American Journal of Obstetrics and Gynecology 121(3): 412-413. February 1, 1975.

47. DUNCAN, G. [Program for the Introduction and Adaptation of Contraceptive Technology] [Research on IUDs] Personal communication, March 2, 1979. 1 p.

48. DUNCAN, G.W. and KALKWARF, D.R. Sustained release systems for fertility control. In: Hafez, E.S.E. and Evans, T.N., eds. Human reproduction: conception and contraception. Hagerstown, Maryland, Harper and Row, 1973. p. 483-504.

49. EASTMAN, N.J. and HELLMAN, L.M. Ectopic pregnancy. In: Eastman, N.J. and Hellman, L.M. Williams' obstetrics. 13th ed. New York, Appleton-Century-Crofts, 1966. p. 541-569.

50. ECHEVERRY, G. Family planning in the immediate postpartum period. Studies in Family Planning: 4(2): 33-35. February 1973.

51. EDELMAN, D.A., BERGER, G.S., and KEITH, L. Intrauterine devices and their complications. Boston, Massachusetts, G.K. Hall. (In press)

52. EINHORN, R.F. and TRIAS, M. Differences between physicians and nurses in providing family planning services: findings from a Bogota clinic. Studies in Family Planning 9(2-3): 35-38. February-March 1978.

53. ELKINS, H. [Columbia University, Center for Population and Family Health] [Research on IUDs] Personal communication, March 2, 1979.

54. ERICKSSON, R. and PHARRISS, B.B. Aspects of Progestasert system use not reported in life tables. In: Mishell, D.R., Jr. and Martinez-Manautou, J., eds. Proceedings of a Symposium on Clinical Experience with the Progesterone Uterine Therapeutic System, Acapulco, Mexico, October 15-16, 1976. Princeton, New Jersey, Excerpta Medica, 1978. p. 123-128.

55. ERKKOLA, R. and LIUKKO, P. Intrauterine device and ectopic pregnancy. Contraception 16(6): 569-574. December 1977.

56. ESCHENBACH, D.A., HARNISCH, J.P., and HOLMES, K.K. Pathogenesis of acute pelvic inflammatory disease: role of contraception and other risk factors. American Journal of Obstetrics and Gynecology 128(8): 838-850. August 15, 1977.

57. FAMILY PLANNING RESEARCH UNIT. An enquiry into ectopic pregnancy and the intrauterine device. Devon, England, University of Exeter, Family Planning Research Unit, May 1974. 14 p.

58. FATHALLA, M.F. Research needs in population and family planning: a view from the developing world. Draper Fund Report, No. 6, Summer 1978. p. 6-8.

59. FAULKNER, W.L. and ORY, H.W. Intrauterine devices and acute pelvic inflammatory disease. Journal of the American Medical Association 235(17): 1851-1853. April 26, 1976.

60. FINCH, B.E. and GREEN, H. Contraception through the ages. Springfield, Illinois, Charles C Thomas, 1963. 174 p.

61. FORD, K. Contraceptive efficacy among married women 15-44 years of age in the United States, 1970-73. Advance Data, No. 26, April 6, 1978. 3 p.

62. FORD, K. Use of intrauterine contraceptive devices in the United States. Advance Data, No. 43, December 12, 1978. 7 p.

63. FORREST, J.E. Postpartum services in family planning: findings to date. Reports on Population/Family Planning, No. 8, July 1971. 15 p.

64. FORTIER, L., LEFEBVRE, Y., LAROSE, M., and LANCTOT, R. Canadian experience with a copper-covered intrauterine contraceptive device. American Journal of Obstetrics and Gynecology 115(3): 291-297. February 1, 1973.

65. FRANKLIN, E.W., 3rd, ZEIDERMAN, A.M., and LAEMMLE, P. Tubal ectopic pregnancy: etiology and obstetric and gynecologic sequelae. American Journal of Obstetrics and Gynecology 117(2): 220-225. September 15, 1973.

66. FUCHS, F., CEDERQVIST, L.L., DONOVAN, S., and LAUERSEN, N.H. Comparison of the Antigon F, the copper T, and the Ypsilon IUDs. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 283-290.

67. FYLLING, P. and FAGERHOL, M. Experience with two different medicated intrauterine devices: a comparative study of the Progestasert and Nova-T. Fertility and Sterility 31(2): 138-141. February 1979.

68. GABELNICK, H. [US National Institutes of Health, Center for Population Research] [Research on IUDs] Personal communication, March 1, 1979.

69. GALLEGOS, A.J., AZNAR, R., MERINO, G., and GUIZER, E. Intrauterine devices and menstrual blood loss: a comparative study of eight devices during the first six months of use. Contraception 17(2): 153-161. February 1978.

70. GIBBS, R.S. The IUD and PID: is the contraceptive the culprit? Contemporary Ob/Gyn 11(4): 163-167. April 1978.

71. GIBOR, Y., NISSEN, C.H., and BRUNSFELD, M. Report to investigators on the Cu-7 intrauterine device: a summary of the data submitted to FDA in the New Drug Application of December 1972. (A confidential report of G.D. Searle and Company, Chicago, Illinois) 115 p.

72. GOLDITCH, I.M. and HUSTON, J.E. Serious pelvic infections associated with intrauterine contraceptive device. International Journal of Fertility 18(3): 156-160. 1973.

73. GOLDMAN, J.A. Infected ovarian cysts and the IUD. Contraception 8(6): 521-526. December 1973.

74. GOLDSMITH, A., GOLDBERG, R., EYZAGUIRRE, H., LUCERO, S., and LIZANA, L. IUD insertion in the immediate postabortal period. In: Goldsmith, A. and Snowden, R., eds. Proceedings of the Family Planning Research Conference: a multidisciplinary approach, Exeter, England, September 27-28, 1971. Amsterdam, Excerpta Medica, 1972. (International Congress Series 260) p. 59-67.

75. GRAEFENBERG, E. An intrauterine contraceptive method. In: Sanger, M. and Stone, H.M., eds. The practice of contraception: an international symposium and survey. (Proceedings of the 7th International Birth Control Conference, Zurich, Switzerland, September 1930) Baltimore, Maryland, Williams and Wilkins, 1931. p. 33-47.

76. GREWAL, S. and DAS SAIGAL, M. Experiences with IUDs in India. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 65-70.

77. GREWAL, S. and DAS SAIGAL, M. Problems arising in the introduction of IUDs in family planning programs. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 59-63.

78. GRIFFITH, A.G. [International Planned Parenthood Federation] [Distribution of IUDs] Personal communication, March 15, 1979. 4 p.

79. GUEST, F. Counseling IUD patients. Health Education Bulletin December 1978. 4 p.

80. GUILLEBAUD, J. Amount and duration of menstrual blood loss with the Progestasert IUD. [Abstract] Paper presented at the 21st British Congress of Obstetrics and Gynaecology, July 1977. p. 33.

81. GUILLEBAUD, J., ANDERSON, A.B.M., and TURNBULL, A.C. Reduction by mefenamic acid of increased menstrual blood loss associated with intrauterine contraception. British Journal of Obstetrics and Gynaecology 85(1): 53-62. January 1978.

82. GUILLEBAUD, J., BARNETT, M.D., and GORDON, Y.B. Plasma ferritin levels as an index of iron deficiency in women using intrauterine devices. British Journal of Obstetrics and Gynaecology 86(1): 51-55. January 1979.

83. GUILLEBAUD, J. and BONNAR, J. Longer though lighter menstrual and intermenstrual bleeding with copper as compared to inert intrauterine devices. British Journal of Obstetrics and Gynaecology 85(9): 707-712. September 1978.

84. GUILLEBAUD, J., BONNAR, J., MOREHEAD, J., and MATTHEWS, A. Menstrual blood-loss with intrauterine devices. Lancet 1(7956): 387-390. February 21, 1976.

85. GUPTA, H.D., BELAVALGIDAD, M.I., GUPTA, I., and DEVI, P.K. A statistical study of the copper T and copper 7 intrauterine devices. Contraception 14(6): 655-660. December 1976.

86. GUPTA, P.K., HOLLANDER, D.H., and FROST, J.K. Actinomycetes in cervico-vaginal smears: an association with IUD usage. Acta Cytologica 20(4): 295-297. July-August 1976.

87. GUPTA, P.K., MALKANI, P.K., and BHASIN, K. Cellular response in the uterine cavity after IUD insertion and structural changes of the IUD. Contraception 4(6): 375-384. December 1971.

88. GUTTORM, E. Menstrual bleeding with intrauterine contraceptive devices. Acta Obstetricia et Gynecologica Scandinavica 50: 9-16. 1971.

89. HAGENFELDT, K. and JOHANNISSON, E. The effect of intrauterine copper on the DNA-content in isolated human endometrial cells. Acta Cytologica 16(5): 472-477. September-October 1972.

90. HAGENFELDT, K. and LANDGREN, B.-M. Local effects of medicated IUDs. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 349-354.

91. HAGENFELDT, K., LANDGREN, B.-M., EDSTRÖM, K., and JOHANNISSON, E. Biochemical and morphological changes in the human endometrium induced by the Progestasert device. Contraception 16(2): 183-197. August 1977.

92. HAGER, W.D. and MAJMUDAR, B. Pelvic actinomycosis in women using intrauterine contraceptive devices. American Journal of Obstetrics and Gynecology 133(1): 60-63. January 1, 1979.

93. HALLATT, J.C.G. Ectopic pregnancy associated with the intrauterine device: a study of seventy cases. American Journal of Obstetrics and Gynecology 125(6): 754-758. July 15, 1976.

94. HALLBERG, L., HÖGDAHL, A.M., NILSSON, L., and RYBO, G. Menstrual blood loss: a population study. Acta Obstetricia et Gynecologica Scandinavica 45: 320-351. 1966.

95. HALLBERG, L. and NILSSON, L. Determination of menstrual blood loss. Scandinavian Journal of Clinical and Laboratory Investigation 16: 224-248. 1964.

96. HASPELS, A.A. [University Hospital, Utrecht, Netherlands] [Ectopic pregnancies and IUDs] Personal communication, March 22, 1979. 1 p.

97. HASSON, H.M. Copper IUDs. Journal of Reproductive Medicine 20(3): 139-154. March 1978.

98. HASSON, H.M. Factors that affect IUD performance: a review and recommendations. Journal of Reproductive Medicine 21(3): 137-145. September 1978.

99. HASSON, H.M., BERGER, G.S., and EDELMAN, D.A. Factors affecting intrauterine contraceptive device performance. American Journal of Obstetrics and Gynecology 126(8): 973-981. December 15, 1976.

100. HATCHER, R.A., STEWART, G.K., STEWART, F., GUEST, F., STRATTON, P., and WRIGHT, A.H. Contraceptive technology 1978-1979. (9th rev. ed.) New York, Irvington, 1978. 192 p.

101. HAVRÁNEK, F. and KRÁLOVÁ, A. Effect of intrauterine contraceptive device upon endometrial exfoliative cytology. Journal of Reproductive Medicine 1(6): 583-586. November-December 1968.

102. HEFNAWI, F., ASKALANI, H., and ZAKI, K. Menstrual blood loss with copper intrauterine devices. Contraception 9(2): 133-140. February 1974.

103. HEFNAWI, F., HOSNI, M., EL-SHEIKHA, Z., SEROUR, G.I., and HASSEEB, F. Perforation of the uterine wall by the Lippes Loop in postpartum women. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 469-476.

104. HEFNAWI, F., KANDIL, O., ASKALANI, A., SEROUR, G.I., ZAKI, K., NASR, F., and MOUSA, M. Mode of action of the copper IUD: effect on endometrial copper and cervical mucus sperm migration. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 459-463.

105. HEFNAWI, F., SALEH, A.A., KANDIL, O., and YACOUT, M.M. Blood loss with IUDs. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 373-380.

106. HEFNAWI, F. and SEGAL, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. 490 p.

107. HEFNAWI, F., YACOUT, M.M., HOSNI, M., EL-SHEIKA, Z., and HASSANEIN, M. Medicated intrauterine devices to improve bleeding events. International Journal of Gynaecology and Obstetrics 15(1): 79-83. 1977.

108. HELVACIOGLU, A., LONG, E.M., Jr., and YANG, S.-L. Ectopic pregnancy: an eight-year review. Journal of Reproductive Medicine 22(2): 87-92. February 1979.

109. HENDERSON, S.R. Pelvic actinomycosis associated with an intrauterine device. Obstetrics and Gynecology 41(5): 726-732. May 1973.

110. HINGORANI, V. and UMA BAI, G.R. Haemoglobin level in women with *post-partum* IUD insertions. Journal of Reproduction and Fertility 27(1): 119-120. October 1971.

111. HORNE, H.W., Jr. and SCOTT, J.M. Adrenosem therapy for bleeding coincident with the use of intrauterine contraceptive devices: a double blind study. Fertility and Sterility 21(3): 230-233. March 1970.

112. HUBER, S.C., PIOTROW, P.T., ORLANS, B., and KOMMER, G. IUDs reassessed: a decade of experience. Population Reports, Series B, No. 2. Washington, D.C., George Washington University Medical Center, Population Information Program, January 1975. 28 p.

113. HURT, W.G. Septic pregnancy associated with Dalkon Shield intrauterine device. Obstetrics and Gynecology 44(4): 491-495. October 1974.

114. INTERNATIONAL FERTILITY RESEARCH PROGRAM [IFRP]. A reassessment of the Lippes Loop for use by menstruating, multiparous women. Research Triangle Park, North Carolina, IFRP, [1979]. (Research Report BBX018) 28 p.

115. ISHIHAMA, A., KAGABU, T., IMAI, T., and SHIMA, M. Cytologic studies after insertion of intrauterine contraceptive devices. Acta Cytologica 14(1): 35-41. January 1970.

116. ISRAEL, R., SHAW, S.T. Jr., and MARTIN, M.A. Comparative quantitation of menstrual blood loss with the Lippes Loop, Dalkon Shield, and copper T intrauterine devices. Contraception 10(1): 63-71. July 1974.

117. JAFAREY, S.A., HARDEE, J.G., and SATTERTHWAITE, A.P. Use of medical-paramedical personnel and traditional midwives in the Pakistan Family Planning Program. Demography 5(2): 666-678. 1968.

118. JAIN, A.K. Comparative performance of the three types of IUDs in the United States. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 3-16.

119. JAIN, A.K. Non-medicated intrauterine devices: review and assessment. In: World Haalth Organization. Regulation of human fertility. (Proceedings of a Symposium on Advances in Fertility Regulation, Moscow, USSR, November 16-19, 1976) Copenhagen, Scriptor, 1977. p. 361-379.

120. JAIN, A.K. Safety and effectiveness of intrauterine devices. Contraception 11(3): 243-259. March 1975.

121. JAIN, A.K. and MOOTS, B. Fecundability following the discontinuation of IUD use among Taiwanese women. Journal of Biosocial Science 9(2): 135-151. 1977.

122. JAIN, A.K. and SIVIN, I. Life-table analysis of IUDs: problems and recommendations. Studies in Family Planning 8(2): 26-47. February 1977.

123. JECHT, E.W. and BERNSTEIN, G.S. The influence of copper on the motility of human spermatozoa. Contraception 7(5): 381-401. May 1973.

124. JENNINGS, J. Report of safety and efficacy of the Dalkon Shield and other IUDs. FDA Ad hoc Obstetric-Gynecology Advisory Committee, October 1974. 19 p. (Mimeo)

125. JOHANSSON, E.D.B. and NYGREN, K.-G. IUDs, ovarian function, and onset of menstrual bleeding. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 335-338.

126. JOHNSON, B. and VESSEY, M. Septic abortion in women using intrauterine devices. British Medical Journal 4(5991): 263-265. November 1, 1975.

127. JOSHI, S.G. Local effects of pharmacologically inert IUDs in rats, baboons, and humans. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 339-348.

128. JOSHI, S.G. and SUJAN-TEJUJA, S. Biochemistry of the human endometrium in users of the intrauterine contraceptive device. Fertility and Sterility 20(1): 98-110. 1969.

129. KAHN, H.S. and TYLER, C.W., Jr. Joint IUD study. American Medical Association, American Osteopathic Association, Center for Disease Control, PHS, DHEW. July 1973.

130. KAHN, H.S. and TYLER, C.W., Jr. Mortality associated with use of IUDs. Journal of the American Medical Association 234(1): 57-59. October 6, 1975.

131. KALLENBERGER, D.A., RONK, D.A., and JIMERSON, G.K. Ectopic pregnancy: a 15-year review of 160 cases. Southern Medical Journal 71(7): 758-763. July 1978.

132. KAMAL, I., HEFNAWI, F., GHONEIM, M., TALAAT, M., and ABDALLA, M. Dimensional and architectural disproportion between the intrauterine device and the uterine cavity: a cause of bleeding. Fertility and Sterility 22(8): 514-521. August 1971.

133. KAMAL, I., GHONEIM, M., TALAAT, M., and ABDALLA, M. Retention and expulsion of IUDs. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 359-366.

134. KATSURA, S., SATODADE, R., and MAKINO, T. Histological study of the endometrium of 459 intrauterine contraceptive device (IUD) users. Yokohama Medical Bulletin 40: 137-144. October 1969.

135. KAYE, B.M., REANEY, B.V., KAYE, D.L., and EDELMAN, D.A. Long-term safety and use-effectiveness of intrauterine devices. Fertility and Sterility 28(9): 937-942. September 1977.

136. KEITH, L., HUGHEY, M.J., and BERGER, G.S. Experience with modern inert IUDs to date: a review and comments. Journal of Reproductive Medicine 20(3): 125-132. March 1978.

137. KESSEL, E., BERNARD, R.P., and THOMAS, M.N. IUD performance and hypothesis testing in international clinical trials. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 87-113.

138. KIM-FARLEY, R.J., CATES, W., Jr., ORY, H.W., and HATCHER, R.A. Febrile spontaneous abortion and the IUD. Contraception 18(6): 561-570. December 1978.

139. KING, D.T. and LAM, M. Actinomycosis of the urinary bladder: association with an intrauterine contraceptive device. Journal of the American Medical Association 240(14): 1512-1513. September 29, 1978.

140. KOETSAWANG, S., RACHAWAT, D., and PIYA-ANANT, M. Outcome of pregnancy in the presence of intrauterine device. Acta Obstetricia et Gynecologica Scandinavica 56(5): 479-482. 1977.

141. KULLANDER, S. Experiences with an IUCD (Margulies Coil). Fertility and Sterility 21(6): 482-489. June 1970.

142. LARSSON, B. and HAMBERGER, L. Insertion of copper-7-IUDs in connection with induced abortions during first trimester. Contraception 12(1): 69-76. July 1975.

143. LARSSON, B., HAMBERGER, L., and RYBO, G. Influence of copper intrauterine contraceptive devices (Cu-7-IUD) on the menstrual blood-loss. Acta Obstetricia et Gynecologica Scandinavica 54(4): 315-318. 1975.

144. LARSSON, B., LIEDHOLM, P., and ÅSTEDT, B. Increased fibrinolytic activity in the endometrium of patients using copper-IUD (Gravigard). International Journal of Fertility 20(2): 77-80. 1975.

145. LARSSON, B., LIEDHOLM, P., SJÖBERG, N.-O., and ÅSTEDT, B. Increased fibrinolytic activity in the endometrium of patients using copper-IUD. Contraception 9(5): 531-537. March 19, 1974.

146. LAST, P.A. Pregnancy and the intrauterine contraceptive device. Contraception 9(5): 439-450. May 1974.

147. LAUFE, L.E. [International Fertility Research Program] [Research on IUDs] Personal communication, 1979.

148. LAUFE, L.E., BRICKNER, P.B., RYSER, P.E., and AMMER, J.L. An evaluation of the use-effectiveness of the Saf-T-Coil in private practice. Contraception 9(1): 23-31. January 1974.

149. LAUFE, L.E., GIBOR, Y., McCLANAHAN, B.J., and WHEELER, R.F. Volume and copper concentration of menstrual discharge from women employing copper-7 and other types of contraceptives. In: Lewit, S., ed. Advances in planned parenthood, Vol. 9. (Proceedings of the 11th Meeting of the Association of Planned Parenthood Physicians, Houston, Texas, April 12-13, 1973) Amsterdam, Excerpta Medica, 1973. p. 38-42.

150. LAUFE, L.E., WHEELER, R., and FRIEL, P. Modification of IUDs for postpartum use. (To be published in Lancet)

151. LEDGER, W.J. Relationship of pelvic infection to various types of contraception. Clinical Obstetrics and Gynecology 17(1): 79-91. March 1974.

152. LEHFELDT, H., TIETZE, C., and GORSTEIN, F. Ovarian pregnancy and the intrauterine device. American Journal of Obstetrics and Gynecology 108(7): 1005-1009. December 1, 1970.

153. LERIDON, H. Les pratiques contraceptives en France (1978). [Contraceptive practice in France (1978)] [FR] Population et Sociétés, No. 120, January 1979. 4 p.

154. LEVINSON, C.J. and RICHARDSON, D.C. The Dalkon Shield story. Advances in Planned Parenthood 11(2): 53-63. 1976.

155. LEWIT, S. Outcome of pregnancy with intrauterine devices. Contraception 2(1): 47-57. July 1970.

156. LIEDHOLM, P., RYBO, G., SJÖBERG, N.-O., and SOLVELL, L. Copper IUD: influence on menstrual blood loss and iron deficiency. Contraception 12(3): 317-325. September 1975.

157. LIEDHOLM, P., SJÖBERG, N.-O., and ÅSTEDT, B. Increased bleeding and fibrinolytic activity in the endometrium in women using the copper T. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 391-395.

158. LIPPES, J. Infection and the IUD: a preliminary report. Contraception 12(1): 103-106. July 1975.

159. LIPPES, J. Management of the lost IUD: a conservative approach. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Risks, benefits, and controversies in fertility control. [Proceedings of the workshop, Arlington, Virginia, March 13-16, 1977] Hagerstown, Maryland, Harper and Row, 1978. p. 404-407.

160. LIPPES, J. PID-IUD association needs more study. [Letter] Contemporary Ob/Gyn 11(5): 13. May 1978.

161. LIPPES, L. A study of intra-uterine contraception: development of a plastic loop. In: Tietze, C. and Lewit, S., eds. Intra-uterine contraceptive devices. (Proceedings of the Conference, New York, April 30-May 1, 1962) Amsterdam, Excerpta Medica, [1962]. (International Congress Series 54) p. 69-75.

162. LIPPES, J., MALIK, T., and TATUM, H.J. The post-coital copper-T. Advances in Planned Parenthood 11(1): 24-29. 1976.

163. LIPPES, J. and ZIELEZNY, M. The loop after ten years. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 225-236.

164. LIUKKO, O., ERKKOLA, R., and LAAKSON, L. Ectopic pregnancies during use of low-dose progestogens for oral contraception. Contraception 16(6): 575-580. December 1977.

165. LOGHMANI, M. and MITRA, M. Evaluation of trained midwives in a copper-T IUD insertion program in Isfahan, Iran. International Journal of Gynaecology and Obstetrics 14(3): 205-207. 1976.

166. LUUKKAINEN, T., NIELSEN, N.-C., NYGREN, K.-G., PYÖRÄLÄ, T., and ALLONEN, H. Combined and national experience of postmenstrual IUD insertions of Nova-T and copper-T in a randomized study. Contraception 19(1): 11-20. January 1979.

167. LUUKKAINEN, T., NIELSEN, N.-C., NYGREN, K.-G., PYÖRÄLÄ, T., and KOSONEN, A. Randomized comparison of clinical performance of two copper-releasing IUDs, Nova-T and copper-T-200, in Denmark, Finland and Sweden. Contraception 19(1): 1-9. January 1979.

168. LUUKKAINEN, T. and NILSSON, C.G. Sustained intrauterine release of d-norgestrel. Contraception 18(4): 451-458. October 1978.

169. LUUKKAINEN, T., TIMONEN, H., and SIVIN, I. Multiclinic copper T studies in Finland. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 243-248.

170. MacMATH, I.F. Antifibrinolytic control of menorrhagia after I.U.D. insertion. Practitioner 210: 417-420. March 1973.

171. MALMQVIST, R., PETERSOHN, L., and BENGTSSON, L.P. Menstrual bleeding with copper-covered intrauterine contraceptive devices. Contraception 9(6): 627-633. June 1974.

172. MARTIN, P.M. and BROWN, J.B. The effect of intrauterine contraceptive devices on ovarian and menstrual function in the human. Journal of Clinical Endocrinology and Metabolism 36(6): 1125-1131. June 1973.

173. MARTINEZ-MANAUTOU, J., AZNAR, R., ROSADO, A., and MAQUEO, M. Clinical experience with the intrauterine progesterone-releasing systems. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 173-184.

174. MAYES, D.G. A comparison of menstrual bleeding patterns associated with three IUD models: an example of reference period analysis. Journal of Biosocial Science 9(1): 121-135. January 1977.

175. MAYES, D.G. Factors in menstrual bleeding patterns. Paper presented at the Exeter Workshop, University of Exeter, 1976.

176. MISHELL, D.R., Jr. Assessing the intrauterine device. Family Planning Perspectives 7(3): 103-111. May-June 1975.

177. MISHELL, D.R., Jr. The clinic factor in evaluating IUDs. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 27-36.

178. MISHELL, D.R., Jr. Current status of contraceptive steroids and the intrauterine device. Clinical Obstetrics and Gynecology 17(1): 35-51. March 1974.

179. MISHELL, D.R., Jr. Historical considerations in the development of modern IUDs: patient and device selections and the importance of insertion techniques. Journal of Reproductive Medicine 20(3): 121-124. March 1978.

180. MISHELL, D.R., Jr. New frontiers of contraception. Journal of Reproductive Medicine 21(5, Suppl.): 256. November 1978.

181. MISHELL, D.R., Jr. Pregnancy related complications and bleeding problems with IUDs. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Risks, benefits, and controversies in fertility control. [Proceedings of the workshop, Arlington, Virginia, March 13-16, 1977] Hagerstown, Maryland, Harper and Row, 1978. p. 428-434.

182. MISHELL, D.R., Jr., ISRAEL, R., and FREID, N. A study of the copper T intrauterine contraceptive device (TCu 200) in nulliparous women. American Journal of Obstetrics and Gynecology 116(8): 1092-1096. August 15, 1978.

183. MISHELL, D.R., Jr. and MOYER, D.L. Association of pelvic inflammatory disease with the intrauterine device. Clinical Obstetrics and Gynecology 12: 179-197. 1969.

184. MOOTS, B.L. Factors affecting the impact of IUDs on fertility control. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 71-86.

185. MOO-YOUNG, A.J., TATUM, H.J., WAN, L.S., and LANE, M.E. Copper levels in certain tissues of rhesus monkeys and of women bearing copper IUDs. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 439-457.

186. MOREHEAD, J.E., MATTHEWS, A., GUILLEBAUD, J., and BONNAR, J. Menstrual blood loss in users of an IUD. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 381-390.

187. MORROW, P. [Program for the Introduction and Adaptation of Contraceptive Technology] [Research on IUDs] Personal communication, March 1979.

188. MOYER, D.L. and MISHELL, D.R., Jr. Reactions of human endometrium to the intrauterine foreign body. 2. Long-term effects on the endometrial histology and cytology. American Journal of Obstetrics and Gynecology 111(1): 66-80. September 1, 1971.

189. MOYER, D.L. and SHAW, S.T., Jr. Intrauterine devices: biological action. In: Hafez, E.S.E. and Evans, T.N., eds. Human reproduction: conception and contraception. Hagerstown, Maryland, Harper and Row, 1973. p. 309-334.

190. MURAMATSU, M. Family planning and contraception. In: Population Problems Research Council and the Mainichi Newspapers. Summary of Fourteenth National Survey on Family Planning. Tokyo, Mainichi Newspapers, [1978]. p. 51-89.

191. NASH, H. [Population Council] [TCu 380] Personal communication, March 5, 1979. 1 p.

192. NEWTON, J., ELIAS, J., McEWAN, J., and MANN, G. Evaluation of the copper 7 in England. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 291-302.

193. NILSSON, C.G. Comparative quantitation of menstrual blood loss with a d-norgestrel-releasing IUD and a Nova-T-copper device. Contraception 15(4): 379-387. April 1977.

194. NILSSON, C.G., JOHANSSON, E.D.B., JACKANICZ, T.M., and LUUKKAINEN, T. Biodegradable polylactate as a steroid-releasing polymer: intrauterine administration of d-norgestrel. American Journal of Obstetrics and Gynecology 122(1): 90-95. May 1, 1975.

195. NILSSON, C.G., JOHANSSON, E.D.B., and LUUKKAINEN, T. A d-norgestrel releasing IUD. Contraception 13(4): 503-514. April 1976.

196. NILSSON, C.G. and LUUKKAINEN, T. Improvement of a d-norgestrel-releasing IUD. Contraception 15(3): 295-306. March 1977.

197. NILSSON, L. and RYBO, G. Treatment of menorrhagia. American Journal of Obstetrics and Gynecology 110(5): 713-720. July 1, 1971.

198. NILSSON, L. and RYBO, G. Treatment of menorrhagia with an antifibrinolytic agent, tranexamic acid (AMCA): a double-blind investigation. Acta Obstetricia et Gynecologica Scandinavica 46: 572-580. 1967.

199. NILSSON, L. and RYBO, G. Treatment of menorrhagia with epsilon amino-caproic acid. Acta Obstetricia et Gynecologica Scandinavica 44: 467-473. 1965.

200. NORTMAN, D. Changing contraceptive patterns: a global perspective. Population Bulletin 32(3): 1-37. August 1977.

201. NORTMAN, D.L. and HOFSTATTER, E. Population and family planning programs: a factbook. (5th ed.) Reports on Population/Family Planning, No. 2, September 1973. 95 p.

202. NORTMAN, D.L. and HOFSTATTER, E. Population and family planning programs: a factbook. (6th ed.) Reports on Population/Family Planning, No. 2, December 1974. 95 p.

203. NORTMAN, D.L. and HOFSTATTER, E. Population and family planning programs. (9th ed.) New York, Population Council, 1978. 92 p.

204. NORTMAN, D.L. and HOFSTATTER, E. Population and family planning programs: a factbook. (10th ed.) New York, Population Council. (In press)

205. NYGREN, K.-G. and JOHANSSON, E.D.B. Postabortion insertion of the intrauterine copper T (TCu 200). In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 115-118.

206. ORLANS, F.B. Copper IUDs: performance to date. Population Reports, Series B, No. 1. Washington D.C., George Washington University Medical Center, Population Information Program, December 1973. 20 p.

207. ORY, H.W. A review of the association between intrauterine devices and acute pelvic inflammatory disease. Journal of Reproductive Medicine 20(4): 200-204. April 1978.

208. OSTER, G.K. Chemical reactions of the copper intrauterine device. Fertility and Sterility 23(1): 18-23. January 1972.

209. OSTER, G. and SALGO, M.P. The copper intrauterine device and its mode of action. New England Journal of Medicine 293(9): 432-438. August 28, 1975.

210. OTA, T. A study on the birth control with an intrauterine instrument. Japanese Journal of Obstetrics and Gynecology 17: 210-214. 1934.

211. PARK, C.B., CHO, L.-J., and PALMORE, J.A. The Euiryong experiment: a Korean innovation in household contraceptive distribution. Studies in Family Planning 8(3): 67-76. March 1977.

212. PARK, C.B., CHO, L.J., and PALMORE, J.A. Household contraceptive distribution: preliminary results for Euiryong, Korea. In: Gardner, J.S., Wolff, R.J., Gillespie, D., and Duncan, G.W., eds. Village and household availability of contraceptives: Southeast Asia, 1976. Seattle, Washington, Battelle Memorial Institute, Human Affairs Research Centers, June 1976. p. 31-54.

213. PASTENE, L., RIVERA, M., ZIPPER, J., MEDEL, M., and THOMAS, M. IUD insertions by midwives: five years' experience in Santiago, Chile. International Journal of Gynecology and Obstetrics 15(1): 84-87. July-August 1977.

214. PATHAK, U.N. and STEWART, D.B. Autotransfusion in ruptured ectopic pregnancy. Lancet 1(7654): 961-964. May 9, 1970.

215. PERLMUTTER, J.F. Pregnancy and the IUD. Journal of Reproductive Medicine 20(3): 133-137. March 1978.

216. PHAOSAVASDI, S., VIVANICHAKUL, B., RIENPRAYURA, D., CHUTIVONGSE, S. VIRUTAMASEN, P., and SNIDVONGS, W. Pelvic inflammatory disease in contraceptive acceptors disclosed at transvaginal tubal sterilization. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 397-399.

217. PHARRISS, B.B. [Alza Corporation] [Alza Corporation research on IUDs] Personal communication, March 13, 1979. 2 p.

218. PHARRISS, B.B. Clinical experience with the intrauterine progesterone contraceptive system. Journal of Reproductive Medicine 20(3): 155-165. March 1978.

219. PHARRISS, B.B. Uterine progesterone system. In: Wheeler, R.G., Duncan, G.W., and Speidel, J.J., eds. Intrauterine devices: development, evaluation, and program implementation. [Proceedings of a Workshop on Advances in IUDs, Battelle Seattle Research Center, Seattle, Washington, October 18-20, 1973] New York, Academic Press, 1974. p. 203-210.

220. PHARRISS, B.B., ERICKSON, R., BASHAW, J., HOFF, S., PLACE, V.A., and ZAFFARONI, A. Progestasert: a uterine therapeutic system for long-term contraception. 1. Philosophy and clinical efficacy. Fertility and Sterility 25(11): 915-921. November 1974.

221. PHATAK, L. and CHANDORKAR, K. Experience with immediate post-partum and post-abortal IUD insertions and disappearance of IUD threads. In: Zatuchni, G.I., ed. Post-partum family planning: a report on the international program. New York, McGraw-Hill, 1970. p. 299-306.

222. PORTER, C.W., Jr. and WAIFE, R.S. Intrauterine devices: current perspectives. Chestnut Hills, Massachusetts, Pathfinder Fund, 1978. 62 p.

223. POTTS, M. [International Fertility Research Program] [IUD research] Personal communication, 1979.

224. POTTS, M. Newsletter to IFRP contributors and friends. Research Triangle Park, North Carolina, December 12, 1978. 2 p. (Mimeo)

225. POTTS, M., SPEIDEL, J.J., and KESSEL, E. Relative risks of various means of fertility control when used in less developed countries. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Risks, benefits, and controversies in fertility control. [Proceedings of the workshop, Arlington, Virginia, March 13-16, 1977] Hagerstown, Maryland, Harper and Row, 1978. p. 404-407.

226. PRESTON, E.J., ERVIN, D.K., McMICHAEL, A.O., and PRESTON, L.W. Septic spontaneous abortion associated with the Dalkon Shield. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 417-428.

227. PUST, K. Ein brauchbarer Frauenschutz. [A useful protection for women] [GE] Deutsche Medizinische Wochenschrift 49(29): 952-953. July 20, 1923.

228. RAGAB, M.I. and THOMAS, M.N. The use of tranexamic acid (AMCA) in IUDs as an anti-bleeding agent. International Journal of Gynaecology and Obstetrics 14(2): 137-141. 1976.

229. RAMASWAMY, S. and SMITH, T. Intrauterine devices. In: Ramaswamy, S. and Smith, T. Practical contraception. Tunbridge Wells, England, Pitman Medical, 1976. p. 57-74.

230. RAMOS, R. and APELO, R.A. A program of IUD insertions by paraprofessionals and physicians in the Philippines. International Journal of Obstetrics and Gynaecology 16(4): 321-323. January-February 1979.

231. RANTAKYLÄ, P., YLÖSTALO, P., JÄRVINEN, P.A., and VUORJOKI, A. Ectopic pregnancies and the use of intrauterine device and low dose progestogen contraception. Acta Obstetricia et Gynecologica Scandinavica 56(1): 61-62. 1977.

232. RATNAM, S.S. and YIN, J.C.K. Translocation of Lippes Loop (the missing loop). British Medical Journal 1(5592): 612-614. March 9, 1968.

233. RAVENHOLT, R.T. [Family planning in China] Personal communication, November 28, 1978.

234. RICHTER, R. Ein Mittel zur Verhutung der Konzeption. [A means of preventing pregnancy] [GE] Deutsche Medizinische Wochenschrift 35: 1525-1527. 1909.

235. RINEHART, W. and PIOTROW, P.T. OCs: update on usage, safety, and side effects. Population Reports, Series A, No. 5. Baltimore, Maryland, Johns Hopkins University, Population Information Program, January 1979. 55 p.

236. ROBLES, F., LOPEZ de la OSA, E., LERNER, U., JOHANNISSON, E., BRENNER, P., HAGENFELDT, K., and DICZFALUSY, E. α-Amylase, glycogen synthetase and phosphorylase in the human endometrium: influence of the cycle and of the Cu-T device. Contraception 6(5): 373-384. November 1972.

237. RODRIGUEZ, G., FAUNDES-LATHAM, A., and ATKINSON, L.E. An approach to the analysis of menstrual patterns in the critical evaluation of contraceptives. Studies in Family Planning 7(2): 42-51. February 1976.

238. ROSENFIELD, A.G. Family planning: an expanded role for paramedical personnel. American Journal of Obstetrics and Gynecology 110(7): 1030-1039. August 1, 1971.

239. ROSENFIELD, A.G. The IUD in national family planning programs: programmatic issues. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 37-45.

240. ROSENFIELD, A.G. and CASTADOT, R.G. Early postpartum and immediate postabortion intrauterine contraceptive device insertion. American Journal of Obstetrics and Gynecology 118(8): 1104-1114. April 15, 1974.

241. ROSS, J.A. and KWON, H.Y. Post-abortal immediate IUD insertion: further experience and a controlled comparison of three devices. Contraception 17(3): 237-252. March 1978.

242. ROWE, P.J. [World Health Organization] [Research on IUDs] Personal communication, March 21, 1979.

243. ROWE, P.J., KOETSAWANG, S., PIZARRO, E., and DIETHELM, P. Comparative bleeding patterns of a progesterone-releasing IUD. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 185-198.

244. RUDEL, H.W., KINCL, F.A., and HENZL, M.R., eds. Birth control, contraception, and abortion. New York, MacMillan, 1973. 372 p.

245. RYBO, G. The IUD and endometrial bleeding. Journal of Reproductive Medicine 20(3): 175-182. March 1978.

246. RYBO, G. and BERGQVIST, A. Comparison of menstrual blood loss with the Progestasert system and the Cu-T-200: preliminary results. In: Mishell, D.R., Jr. and Martinez-Manautou, J., eds. Proceedings of a Symposium on Clinical Experience with the Progesterone Uterine Therapeutic System, Acapulco, Mexico, October 15-16, 1976. Princeton, New Jersey, Excerpta Medica, 1978. p. 106-110.

247. RYDER, N.B. Contraceptive failure in the United States. Family Planning Perspectives 5(3): 133-142. Summer 1973.

248. RYDER, N.B. Time series of pill and IUD use: United States, 1961-1970. Studies in Family Planning 10(3): 233-240. October 1972.

249. SAĞIROĞLU, N. Local effects of polyethylene IUDs in women: mode of action, a synthetic vaccine, and a macrophagic immunity. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 465-468.

250. SAĞIROĞLU, N. Phagocytosis of spermatozoa in the uterine cavity of woman using intrauterine device. International Journal of Fertility 16(1): 1-14. January-March 1971.

251. SAĞIROĞLU, N. and SAĞIROĞLU, E. The cytology of intrauterine devices. Acta Cytologica 14: 58-64. 1970.

252. SATTAR, M.A. The status and trends of family planning programmes in developing countries: a case study of Bangladesh. [Statement, April 27, 1978] In: United States. Congress. House of Representatives. Select Committee on Population. Population and development: status and trends of family planning/population programs in developing countries. Vol. 2. Hearings, April 25-27, 1978. Washington, D.C., U.S. Government Printing Office, 1978. p. 630-640.

253. SAVOLAINEN, E. and SAKSELA, E. Ectopic pregnancy: relationship to the preceding contraception. Annales Chirurgiae et Gynaecologiae 67: 198-202. 1978.

254. SCHIFFER, M.A., ELGUEZABAL, A., and ALLEN, A.C. Actinomycosis infection associated with intrauterine contraceptive device and a vaginal pessary. Advances in Planned Parenthood 7(4): 183-193. 1978.

255. SCHMIDT, F. [Population Council] [Pregnancies subsequent to use of copper T devices] Personal communication, March 1979.

256. SCHNEIDER, J., BERGER, C.J., and CATTELL, C. Maternal mortality due to ectopic pregnancy: a review of 102 deaths. Obstetrics and Gynecology 49(5): 557-561. May 1977.

257. SCHOEN, J.A. and NOWAK, J.R. Repeat ectopic pregnancy: a 16-year clinical survey. Obstetrics and Gynecology 45(5): 542-546. May 1975.

258. SCOMMEGNA, A. Medicated IUDs: an improvement? In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Risks, benefits, and controversies in fertility control. [Proceedings of the workshop, Arlington, Virginia, March 13-16, 1977] Hagerstown, Maryland, Harper and Row, 1978. p. 459-466.

259. SCOMMEGNA, A., AVILA, T., LUNA, M., RAO, R., and DMOWSKI, W.P. Fertility control by intrauterine release of progesterone. Obstetrics and Gynecology 43(5): 769-779. May 1974.

260. SCOMMEGNA, A., PANDYA, G.N., CHRIST, M., LEE, A.W., and COHEN, M.R. Intrauterine administration of progesterone by a slow releasing device. Fertility and Sterility 21(3): 201-210. March 1970.

261. SCUTCHFIELD, F.D. and LONG, W.N. Perforation of the uterus with the Lippes Loop: epidemiologic analysis. Journal of the American Medical Association 208(12): 2335-2336. June 23, 1969.

262. SEGAL, S.J. Diary notes on trip to China: Peking. September 24, 1977. (Unpublished) 2 p.

263. SEGAL, S.J. and NORDBERG, O.S. Fertility regulation technology: status and prospects. Population Bulletin 31(6): 1-25. March 1977.

264. SEGAL, S.J., SOUTHAM, A.L., and SHAFER, K.D. Intra-uterine contraception. (Proceedings of the 2nd International Conference, New York, October 2-3, 1964) Amsterdam, Excerpta Medica, 1965. (International Congress Series 86) 250 p.

265. SEGAL, S.J. and TIETZE, C. Contraceptive technology: current and prospective methods. Reports on Population/Family Planning, No. 1. July 1971. p. 1-24.

266. SHAILA, N.G., LANE, M.E., and SOBRERO, A.J. A comparative randomized double-blind study of the copper-T200 and copper-7 intrauterine contraceptive devices with modified insertion techniques. American Journal of Obstetrics and Gynecology 120(1): 110-116. September 1, 1974.

267. SHAW, S.T., Jr. and MOYER, D.L. Problem bleeding with IUDs. In: Wheeler, R.G., Duncan, G.W., and Speidel, J.J., eds. Intrauterine devices: development, evaluation, and program implementation. [Proceedings of a Workshop on Advances in IUDs, Battelle Seattle Research Center, Seattle, Washington, October 18-20, 1973] New York, Academic Press, 1974. p. 99-103.

268. SHINE, R.M. and THOMPSON, J.F. The in situ IUD and pregnancy outcome. American Journal of Obstetrics and Gynecology 119(1): 124-130. May 1, 1974.

269. SIDDALL, R.S. The intrauterine contraceptive pessary: inefficient and dangerous. American Journal of Obstetrics and Gynecology 8(1): 76-79. July 1924.

270. SIEGLER, A.M. and KEMMANN, E. Location and removal of misplaced or embedded intrauterine devices by hysteroscopy. Journal of Reproductive Medicine 16(3): 139-144. March 1976.

271. SIVIN, I. [Population Council] [Analysis of IUD research results] Personal communication. March 1, 1979.

272. SIVIN, I. Contraception and fertility change in the international postpartum program. New York, Population Council, 1974. 98 p.

273. SIVIN, I. Copper T IUD use and ectopic pregnancy rates in the United States. Contraception 19(2): 151-173. February 1979.

274. SIVIN, I. Effect of calcium deposition on copper IUDs. [Letter] British Medical Journal 2(6083): 387. August 6, 1977.

275. SIVIN, I. The effectiveness of the copper-T intrauterine device: a collaborative study in five countries. Studies in Family Planning 4(7): 162-170. July 1973.

276. SIVIN, I. Standards for measurement and reporting life table IUD rates to minimize bias. Paper presented at FDA Conception Control Sub-Committee, Panel on Review of Obstetrical and Gynecological Devices, Washington, D.C., March 15-16, 1976. 21 p.

277. SIVIN, I. Two years of experience with the copper T (TCu 200): a study in four developing countries. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 249-282.

278. SIVIN, I. and STERN, J. Long-acting and more effective copper T devices. Studies in Family Planning. (In press)

279. SMITH, H.M., SMITH, W.I., and EDWARDS, S.J. The detection of intrauterine contraceptive devices by ultrasonic investigation. Radiology 43(507): 60-62. March 1977.

280. SMITH, M.R. and SODERSTROM, R. Salpingitis: a frequent response to intrauterine contraception. Journal of Reproductive Medicine 16(4): 159-162. April 1976.

281. SMITH, M., VESSEY, M.P., BOUNDS, W., and WARREN, J. Progestogen-only oral contraception and ectopic gestation. British Medical Journal 4(5936): 104-105. October 12, 1974.

282. SNOWDEN, R. Pelvic inflammation, perforation, and pregnancy outcome associated with the use of IUDS. Paper presented at the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974. 6 p.

283. SNOWDEN, R. The Progestasert and ectopic pregnancy. [Letter] British Medical Journal 2(6102): 1600-1601. December 17, 1977.

284. SNOWDEN, R. The statistical analysis of menstrual bleeding patterns. Journal of Biosocial Science 9(1): 107-120. January 1977.

285. SNOWDEN, R., WILLIAMS, M., and HAWKINS, D. The IUD: a practical guide. London, Croom Helm, 1977. 113 p.

286. SOBRERO, A.J. Intrauterine devices in clinical practice. Family Planning Perspectives 3(1): 16-24. January 1971.

287. SODERSTROM, R.M. The wandering IUD: what to do? In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Risks, benefits, and controversies in fertility control. [Proceedings of the workshop, Arlington, Virginia, March 13-16, 1977] Hagerstown, Maryland, Harper and Row, 1978. p. 408-412.

288. SOMBOONSUK, A., CHIAWCHARNWIT, T., ONTHUAM, Y., CHAUDHURY, R.R., FUCHS, F., and GROSSMAN, R. Randomized comparative trial of three IUDs in rural Thailand: preliminary report of first 12-month follow-up. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 199-204.

289. SOMBOONSUK, A. and ROSENFIELD, A.G. Experiences with the Lippes Loop 1965-1971. International Journal of Gynaecology and Obstetrics 11(1): 16-24. January 1973.

290. SOUTHAM, A.L. Historical review of intra-uterine devices. In: Segal, S.J., Southam, A.L., and Shaffer, K.D., eds. Intra-uterine contraception. (Proceedings of the 2nd International Conference, New York, October 2-3, 1964) New York, Excerpta Medica, 1965. (International Congress Series 86) p. 3-5.

291. SPARKS, R.A., BUCKINGHAM, M.S., ELSTEIN, M., WATT, P.J., and PURRIER, B.G.A. Maternal death and the I.U.D. [Letter] Lancet 1(8002): 98. January 8, 1977.

292. SPARKS, R.A. and LETCHWORTH, A.T. Mid-trimester septic abortion and Escherichia coli septicaemia in a copper IUCD user. British Medical Journal 1(6111): 481-482. February 25, 1978.

293. SPEIDEL, J.J. [US Agency for International Development] [Program assistance] Personal communication, March 1979.

294. SPEIDEL, J.J. [US Agency for International Development] [Research on IUDs] Personal communication, December 1978.

295. SPEIDEL, J.J., KESSEL, E., BERGER, G.S., and LABBOK, M. Recent developments in technology for the control of female fertility. Obstetrics and Gynecology Annual 7: 397-445. 1978.

296. SPEIDEL, J.J. and RAVENHOLT, R.T. The role of IUDs in developing countries. In: Wheeler, R.G., Duncan, G.W., and Speidel, J.J., eds. Intrauterine devices: development, evaluation, and program implementation [Proceedings of a Workshop on Advances in IUDs, Battelle Seattle Research Center, Seattle, Washington, October 18-20, 1973] New York, Academic Press, 1974. p. 1-31.

297. SPENCE, M.R., GUPTA, P.K., FROST, J.K., and KING, T.M. Cytologic detection and clinical significance of Actinomyces israelii in women using intrauterine contraceptive devices. American Journal of Obstetrics and Gynecology 131(3): 295-298. June 1, 1978.

298. STADEL, B. [US National Institutes of Health, Center for Population Research] [Research on IUDs] Personal communication, March 1, 1979.

299. STATHAM, R. and MORTON, R.S. Gonorrhoea and the intrauterine contraceptive device. British Medical Journal 4(5631): 623-625. December 7, 1968.

300. STEVEN, J.D. and FRASER, I.S. The outcome of pregnancy after failure of an intrauterine contraceptive device. Journal of Obstetrics and Gynaecology of the British Commonwealth 81: 282-284. April 1974.

301. STEWART, D.B. Autotransfusion in ruptured tubal ectopic pregnancy. In: Purandare, B.N. and Jhaveri, C.L., eds. Proceedings of the International Seminar on Maternal Mortality, Family Planning and Biology of Reproduction, held at Bombay on 3rd to 8th March 1969. Bombay, India, Federation of Obstetric and Gynaecological Societies of India, [1970]. p. 65-66.

302. STEWART, W.C., GIBOR, Y., DEYSACH, L., and NISSEN, C. Clinical studies with the Cu 7: a comparison of results in parous and nulliparous women. In: International Planned Parenthood Federation [IPPF]. Clinical Proceedings, Southeast Asia at Oceania Congress, Sydney, 1972. London, IPPF, 1973. p. 211-214.

303. STEWART, W.C., O'BRIEN, F., NISSEN, C., and DEYSACH, L. Multiclinic evaluation of Gravigard (Cu 7) intrauterine contraception. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 149-153.

304. SWEDISH INTERNATIONAL DEVELOPMENT AUTHORITY. [IUD distribution] Personal communication, March 22, 1979. 1 p.

305. TAMADA, T., OKAGAKI, T., MARUYAMA, M., and MATSUMOTO, S. Endometrial histology associated with an intrauterine contraceptive device. American Journal of Obstetrics and Gynecology 98(6): 811-817. July 15, 1967.

306. TAMAYO, F. The Colombian experience: a statement to the Congress of the United States. [Statement, April 25, 1978] In: United States. Congress. House of Representatives. Select Committee on Population. Population and development: status and trends of family planning/population programs in developing countries. Vol. 2. Hearings, April 25-27, 1978. Washington, D.C., U.S. Government Printing Office, 1978. p. 299-312.

307. TARGUM, S.D. and WRIGHT, N.H. Association of the intrauterine device and pelvic inflammatory disease: a retrospective pilot study. American Journal of Epidemiology 100(4): 262-271. October 1974.

308. TATUM, H.J. Clinical aspects of intrauterine contraception: circumspection 1976. Fertility and Sterility 28(1): 3-28. January 1977.

309. TATUM, H.J. Comparative experience with newer models of the copper T in the United States. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 155-163.

310. TATUM, H.J. Intrauterine contraception. American Journal of Obstetrics and Gynecology 112(7): 1001-1023. April 1, 1972.

311. TATUM, H.J., HATCHER, R.A., MISHELL, D.R., Jr., SCOMMEGNA, A., and ZIPPER, J.A. Which IUD should you prescribe? Contemporary Ob/Gyn 11(4): 126 ff. April 1978.

312. TATUM, H.J. and SCHMIDT, F.H. Contraceptive and sterilization practices and extrauterine pregnancy: a realistic perspective. Fertility and Sterility 28(4): 407-421. April 1977.

313. TATUM, H.J., SCHMIDT, F.H., and JAIN, A.K. Management and outcome of pregnancies associated with the copper T intrauterine contraceptive device. American Journal of Obstetrics and Gynecology 126(7): 869-879. December 1, 1976.

314. TATUM, H.J., SCHMIDT, F.H., and PHILLIPS, D.M. Morphological studies of Dalkon Shield tails removed from patients. Contraception 11(4): 465-477. April 1975.

315. TATUM, H.J., SCHMIDT, F.H., PHILLIPS, D., McCARTY, M., and O'LEARY, W.M. The Dalkon Shield controversy: structural and bacteriological studies of IUD tails. Journal of the American Medical Association 231(7): 711-717. February 17, 1975.

316. TATUM, H.J., SCHMIDT, F.H., PHILLIPS, D., McCARTY, M., and O'LEARY, W.M. Microbial migration in the thread attached to an IUD as a possible factor in infectious complications. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 411-415.

317. TATUM, H.J. and ZIPPER, J.A. The "T" intrauterine contraceptive device and recent advances in hormonal anticonceptional therapy. Paper presented at the 6th Northeast Obstetrics-Gynecology Congress, Bahia, Brazil, October 4-9, 1968. 6 p.

318. TAUBER, P.F., WOLF, A.S., HERTING, W., and ZANEVELD, L.J.D. Hemorrhage induced by intrauterine devices: control by local proteinase inhibition. Fertility and Sterility 28(12): 1375-1377. December 1977.

319. TEJUJA, S., CHOUDHURY, S.D., MALHOTRA, U., and SAXENA, N.C. Clinical trial with the copper 7 intrauterine device: one year experience in India. Contraception 10(4): 351-360. October 1974.

320. TEJUJA, S., SAXENA, N.C., MALHOTRA, U., and CHOUDHURY, S.D. Experience with the copper T in India. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 165-171.

321. THEIRY, M., VAN DER PAS, H.M., VAN OS, W.A.A., TAUBER, P.F., DOMBROWICZ, N., McDONALD, J.S., HASPELS, A.A., DROGENDIJK, A.C., VAN KETS, H., and BOOGERS, W. Three years experience with the MLCu 250, a new copper wired intrauterine contraceptive device. Advances in Planned Parenthood 13(3-4): 35-40. 1978.

322. TIETZE, C. Contraception with intrauterine devices: 1959-1966. American Journal of Obstetrics and Gynecology 96(7): 1043-1054. December 1, 1966.

323. TIETZE, C. and LEWIT, S. Evaluation of intrauterine devices: ninth progress report of the Cooperative Statistical Program. Studies in Family Planning 55: 1-40. July 1970.

324. TIETZE, C. and LEWIT, S., eds. Intra-uterine contraceptive devices. (Proceedings of the Conference, New York, April 30-May 1, 1962) Amsterdam, Excerpta Medica, [1962]. (International Congress Series 54) 200 p.

325. TIMONEN, H. and LUUKKAINEN, T. Immediate postabortion insertion of the copper-T (TCu-200) with eighteen months follow-up. Contraception 9(2): 153-160. February 1974.

326. TIMONEN, H. and LUUKKAINEN, T. The use-effectiveness of the copper-T-200 in a simulated field trial. Contraception 9(1): 1-13. January 1974.

327. TYLER, C.W., Jr. and KAHN, H.S. Morbidity and mortality associated with use of IUDs in the United States and Puerto Rico. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 47-57.

328. UNITED NATIONS FUND FOR POPULATION ACTIVITIES [UNFPA]. Inventory of population projects in developing countries around the world 1976/77. New York, UNFPA, [1978]. 687 p.

329. UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT [USAID]. OFFICE OF POPULATION. Family planning service statistics, annual report, 1976. Washington, D.C., USAID, 1977. 150 p.

330. UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT [USAID]. OFFICE OF POPULATION. Family planning program statistics by quarter: 1977. Washington, D.C., USAID, [1977]. 28 p. (Mimeo)

331. UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT. OFFICE OF POPULATION. [IUD deliveries] Personal communication. 1979. 3 p.

332. UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. CENTER FOR DISEASE CONTROL. IUD safety: report of a nationwide physician survey. Morbidity and Mortality Weekly Report 23(26): 226, 231. June 29, 1974.

333. UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. FOOD AND DRUG ADMINISTRATION. Intrauterine contraceptive devices, professional and patient labeling. Federal Register 42(90): 23772-23783. May 10, 1977.

334. UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. FOOD AND DRUG ADMINISTRATION. Progestasert IUD and ectopic pregnancy. FDA Drug Bulletin 8(6): 37. December 1978-January 1979.

335. UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. FOOD AND DRUG ADMINISTRATION. Statement of policy concerning new drug states of certain intrauterine devices. Federal Register 38(44): 6137. March 7, 1973.

336. UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. FOOD AND DRUG ADMINISTRATION. ADVISORY COMMITTEE ON OBSTETRICS AND GYNECOLOGY. Report on intrauterine contraceptive devices. Washington, D.C., U.S. Government Printing Office, 1968. 101 p.

337. UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. FOOD AND DRUG ADMINISTRATION. MEDICAL DEVICE AND DRUG ADVISORY COMMITTEES ON OBSTETRICS AND GYNECOLOGY. Second report on intrauterine contraceptive devices. Washington, D.C., U.S. Government Printing Office, December 1978. 102 p.

338. UNITED STATES NATIONAL INSTITUTES OF HEALTH. CENTER FOR POPULATION RESEARCH. Ten year progress report. Rockville, Maryland, Center for Population Research, November 1978.

339. VAN IDDEKINGE, B. Ectopic pregnancy: a review. South African Medical Journal 46: 1844-1849. November 2, 1972.

340. VAUGHAN, B., TRUSSELL, J., MENKEN, J., and JONES, E.F. National Center for Health Statistics: contraceptive efficacy among married women, 1970-73. (To be published in PHS 1000-Series 23)

341. VESSEY, M., DOLL, R., PETO, R., JOHNSON, B., and WIGGINS, P. A long-term follow-up study of women using different methods of contraception: an interim report. Journal of Biosocial Science 8(4): 373-427. October 1976.

342. VESSEY, M.P., JOHNSON, B., DOLL, R., and PETO, R. Outcome of pregnancy in women using an intrauterine device. Lancet 1(7856): 495-498. March 23, 1974.

343. VESSEY, M.P., WRIGHT, N.H., McPHERSON, K., and WIGGINS, P. Fertility after stopping different methods of contraception. British Medical Journal 1(6108): 265-267. February 4, 1978.

344. VIECHNICKI, M.B. Septicemia and abortion with the CU-7. American Journal of Obstetrics and Gynecology 127(2): 203. January 15, 1977.

345. VIEL, B. and LUCERO, S. An analysis of 3 years' experience with intrauterine devices among women in the western area of the city of Santiago, July 1, 1964, to June 30, 1967. American Journal of Obstetrics and Gynecology 106(5): 765-775. March 1, 1970.

346. VIRKAR, K. and PARULKAR, N. Pregnancies and intrauterine devices with special reference to the outcome of pregnancies and the fate of the devices. Journal of Obstetrics and Gynaecology of India 24(4): 332-340. August 1974.

347. WAGATSUMA, T. Clinical experience with the Progestasert intrauterine progesterone contraceptive system in Asia. In: Mishell, D.R., Jr. and Martinez-Manautou, J., eds. Proceedings of a Symposium on Clinical Experience with the Progesterone Uterine Therapeutic System, Acapulco, Mexico, October 15-16, 1976. Princeton, New Jersey, Excerpta Medica, 1978. p. 91-95.

348. WAGATSUMA, T., SAKAMOTO, S., MATSUYAMA, E., AMENOMORI, Y., KOBAYASHI, T., TAKADA, M., MATSUDA, S., FUJIMOTO, S., SHIMIZU, T., SUZUKI, M., ISHIHAMA, A., NAKANISHI, T., SUNOUCHI, S., and SEKIBA, K. A study on the contraceptive effectiveness of a newly designed IUD "FD-1" in Japan. Contraception 17(1): 41-49. January 1978.

349. WAN, L.S., HSU, Y.-C., GANGULY, M., and BIGELOW, B. Effects of the Progestasert on the menstrual pattern, ovarian steroids and endometrium. Contraception 16(4): 417-433. October 1977.

350. WEEKES, A.R.L. and HUTCHINS, C.J. Ectopic pregnancy: a five year review. British Journal of Clinical Practice 30(5): 104-106. May 1976.

351. WEEKES, A.R.L. and SUTHERST, J.R. Ectopic pregnancy and the I.U.D. [Letter] Lancet 2(7945): 1144. December 6, 1975.

352. WEI, P.Y. Downward displacement of IUDs and related problems of accidental pregnancy and cervical penetration. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 367-371.

353. WEI, P.Y. Occurrence of ectopic pregnancy in women with IUD's and consideration of the contraceptive mechanism of the IUD. American Journal of Obstetrics and Gynecology 101(6): 776-778. July 15, 1968.

354. WELANDER, M. [AB Kabi, Stockholm, Sweden] [Copper T marketing] Personal communication, March 6, 1979. 1 p.

355. WESTRÖM, L. [University Hospital, Lund, Sweden] [Ectopic pregnancy] Personal communication, April 2, 1979.

356. WESTRÖM, L. Effect of acute pelvic inflammatory disease on fertility. American Journal of Obstetrics and Gynecology 121(5): 707-713. March 1, 1975.

357. WESTRÖM, L. and BENGTSSON, L.P. Effect of tranexamic acid (AMCA) in menorrhagia with intrauterine contraceptive devices: a

double-blind study. Journal of Reproductive Medicine 5(4): 41-48. October 1970.

358. WESTRÖM, L., BENGTSSON, L.P., and MÅRDH, P.A. The risk of pelvic inflammatory disease in women using intrauterine contraceptive devices as compared to non-users. Lancet 2(7979): 221-224. July 31, 1976.

359. WHEELER, R.G. [International Fertility Research Program] [Research on IUDs] Personal communication, March 1, 1979.

360. WHEELER, R.G., BUSCHBOM, R.L., and MARSHALL, R.K. A rational basis for IUD design and development. In: Wheeler, R.G., Duncan, G.W., and Speidel, J.J., eds. Intrauterine devices: development, evaluation, and program implementation. [Proceedings of a Workshop on Advances in IUDs, Battelle Seattle Research Center, Seattle, Washington, October 18-20, 1973] New York, Academic Press, 1974. p. 163-184.

361. WHEELER, R.G., DUNCAN, G.W., and SPEIDEL, J.J., eds. Intrauterine devices: development, evaluation, and program implementation. [Proceedings of a Workshop on Advances in IUDs, Battelle Seattle Research Center, Seattle, Washington, October 18-20, 1973] New York, Academic Press, 1974. 260 p.

362. WHELAN, E.M. Attitudes toward menstruation. Studies in Family Planning 6(4): 106-108. April 1975.

363. WHITE, M.K., ORY, H.W., ROOKS, J.B., and ROCHAT, R.W. Intrauterine device termination rates and the menstrual cycle day of insertion. Atlanta, Georgia, Center for Disease Control. 18 p. (Unpublished)

364. WHITE, M.K., ROOKS, J.B., STRAUSS, L., ROCHAT, R.W., TYLER, C.W., Jr., and SENANAYAKE, P. Current practice concerning time of IUD insertion. IPPF Medical Bulletin 11(6): 1-3. December 1977.

365. WILLIAMS, P., JOHNSON, B., and VESSEY, M. Septic abortion in women using intrauterine devices. British Medical Journal 4(5991): 263-264. November 1, 1975.

366. WILSON, E.W. The effect of copper on lactic dehydrogenase isoenzymes in human endometrium. Contraception 16(4): 367-375. October 1977.

367. WORLD HEALTH ORGANIZATION [WHO]. Intrauterine devices: physiological and clinical aspects. Geneva, WHO, 1968. (Technical Report Series 397) 32 p.

368. WORLD HEALTH ORGANIZATION [WHO]. Seventh annual report. Geneva, WHO, 1978. 167 p.

369. WRIGHT, N.H. and LAEMMLE, P. Acute pelvic inflammatory disease in an indigent population: an estimate of its incidence and relationship to methods of contraception. American Journal of Obstetrics and Gynecology 101(7): 979-990. August 1, 1968.

370. WRIGHT, N.H., SUJPLUEM, C., ROSENFIELD, A.G., and VARAKAMIN, S. Nurse-midwife insertion of the copper T in Thailand: performance, acceptance, and programmatic effects. Studies in Family Planning 8(9): 237-243. September 1977.

371. WRIGHT, N.H., SUVANAVEJH, C., KLINCHOM, P., and VARAKAMIN, S. Copper T-200: combined Bangkok hospital clinical evaluation. Contraception 10(3): 231-240. September 1974.

372. WYNN, R.M. and SAWARAGI, I. Effects of intra-uterine and oral contraceptives on the ultrastructure of the human endometrium. Journal of Reproduction and Fertility (Suppl. 8): 45-57. 1969.

373. ZADOR, G., NILSSON, B.A., NILSSON, B., SJÖBERG, N.-O., WESTRÖM. L., and WIESE, J. Clinical experience with the uterine progesterone system (Progestasert). Contraception 13(5): 559-569. May 1976.

374. ZATUCHNI, G.I. Overview of program: two-year experience. In: Zatuchni, G.I., ed. Post-partum family planning: a report on the international program. New York, McGraw-Hill, 1970. p. 30-88.

375. ZEIGHAMI, E., ZEIGHAMI, B., EFTEKHARI, A.E., and KHOSHNEVIS, P. Effectiveness of the Iranian auxiliary midwife in IUD insertion. Studies in Family Planning 7(9): 261-263. September 1976.

376. ZIPPER, J. Chilean experience with IUDs: updating the program. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 217-224.

377. ZIPPER, J., EDELMAN, D.A., and GOLDSMITH, A. An overview of IUD research and implications for the future. International Journal of Gynaecology and Obstetrics 15(1): 73-78. 1977.

378. ZIPPER, J., MEDEL, M., GOLDSMITH, A., and EDELMAN, D.A. Six-year continuation rates for Cu-T-200 users. Journal of Reproductive Medicine 18(2): 95-97. February 1977.

379. ZIPPER, J., MEDEL, M., OSORIO, A., GOLDSCHMITH, A., and EDELMAN, D.A. Long-term use effectiveness of the Cu-7-200 IUD. International Journal of Gynaecology and Obstetrics 14(2): 142-144. 1976.

380. ZIPPER, J., MEDEL, M., PASTENE, L., RIVERA, M., and TATUM, H.J. Human fertility control through the use of endouterine metal antagonisms of trace elements (EMATE). In: Diczfalusy, E. and Borell, U., eds. Control of human fertility. (Proceedings of the 15th Nobel Symposium, Södergarn, Lidingö, Sweden, May 27-29, 1970) New York, John Wiley and Sons, 1971. p. 199-218.

381. ZIPPER, J., MEDEL, M., PASTENE, L., RIVERA, M., TORRES, L., OSORIO, A., and TOSCANINI, C. Four years experience with the Cu7 200 device: endouterine copper in fertility control. Contraception 13(1): 7-15. January 1976.

382. ZIPPER, J., MEDEL, M., AND PRAGER, R. Suppression of fertility by intrauterine copper and zinc in rabbits: a new approach to intrauterine contraception. American Journal of Obstetrics and Gynecology 105(4): 529-534. October 15, 1969.

383. ZIPPER, J.A., TATUM, H.J., PASTENE, L., MEDEL, M., and RIVERA, M. Metallic copper as an intrauterine contraceptive adjunct to the "T" device. American Journal of Obstetrics and Gynecology 105(8): 1274-1278. December 15, 1969.

ADDENDA

384. BENGTSSON, L.P. and MOAWAD, A.H. The effect of the Lippes Loop on human myometrial activity. American Journal of Obstetrics and Gynecology 98(7): 957-965. August 1, 1967.

385. EISINGER, S.H. Second-trimester spontaneous abortion, the IUD, and infection. American Journal of Obstetrics and Gynecology 124(4): 393-397. February 1976.

386. GÓMEZ-ROGERS, C., IBARRA POLO, A.A., FAÚNDES, A., and GUILOFF, E. Effect of the IUD and other contraceptive methods on lactation. In: Hankinson, R.K.B., Kleinman, R.L., and Eckstein, P., eds. Proceedings of the 8th International Conference of the International Planned Parenthood Federation, Santiago, Chile, April 9-15, 1967. London, International Planned Parenthood Federation, December 1967. p. 328-334.

387. GUILLEBAUD, J. Location of "lost" IUDs. [Letter] British Journal of Family Planning 3: 43-44. 1977.

388. GUILLEBAUD, J. and KASONDE, J.M. A simple scheme for managing the problem of "lost threads" with intrauterine devices. (To be published in Fertility and Contraception)

389.HEFNAWI, F., KANDIL, O., HAMDI, M., BADRAOUI, H., EL-GAALI, O., ABDEL-KADER, M.M., TALAAT, M., AZIZ, A., and BAHGAT, R. Effect of inert IUDs on lactation. In: Hefnawi, F. and Segal, S.J., eds., Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, North-Holland, 1975. p. 431-438.

390. HINGORANI, V. and UMA BAI, G.R. Lactation and lactational amenorrhoea with *post-partum* IUCD insertions. Journal of Reproduction and Fertility 23(3): 513-515. December 1970.

391. HORN, H., FINKELSTEIN, M., BEN-DAVID, M., SALZBERGER, M., CHOWERS, I., BEN-ASSULY, S., and BELL, J. Possible effect of intrauterine device on galactorrhea in women. Contraception 12(4): 419-424. October 1975.

392. JONAS, G. Ectopic pregnancy despite intrauterine contraception: a clue to mode of action of I.U.C.D.s. British Medical Journal 3(5981): 467. August 23, 1975.

393. KOSONEN, A. [Outokumpu Oy, Pori, Finland] [Availability and design of Nova T] Personal communication, March 30, 1979. 2 p.

394. KOSONEN, A. Corrosion of copper in utero. Fertility and Sterility 30(1): 59-65. July 1978.

395. MEHTA, S., PAWAR, V., JOSHI, J., KORA, S., RAJANI, U., VIRKAR, K.D., RAIKAR, R.S., and SHETH, A.R. Serum prolactin levels in women using copper IUDs. Contraception 15(3): 327-334. March 1977.

396. OSTERIA, T.S. The effects of contraception upon lactation: analysis of urban data. [1976] 18 p. (Unpublished)

397. SHAPIRO, A.G. Management of the lost intrauterine contraceptive device. Obstetrics and Gynecology 49(2): 238-240. February 1977.

398. SPELLACY, W.N. and BUHI, W.C. A prospective study of plasma prolactin levels in women using the progesterone releasing intrauterine device (P-IUD). Contraception 19(1): 91-94. January 1979.

399. WENOF, M., AUBERT, J.M., and REYNIAK, J.V. Serum prolactin levels in short-term and long-term use of inert plastic and copper intrauterine devices. Contraception 19(1): 21-27. January 1979.

400. WORLD HEALTH ORGANIZATION. SPECIAL PROGRAMME OF RESEARCH, DEVELOPMENT AND RESEARCH TRAINING IN HUMAN REPRODUCTION. An assessment of the Lippes Loop D and the Copper T 220C. HRP/79.1 Rev. 1. April 1979. 4 p.

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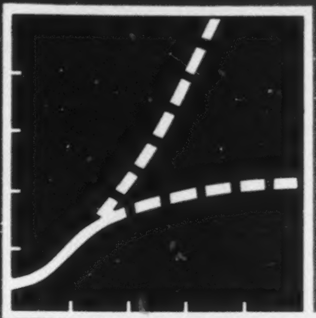

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SPECIAL TOPIC MONOGRAPHS

Population Information Program, The Johns Hopkins University, Hampton House, 624 North Broadway, Baltimore, Maryland 21205, USA

The World Fertility Survey: Current Status and Findings

by
Sir Maurice Kendall
Project Director, World Fertility Survey

Editor's Summary. The World Fertility Survey (WFS) is the largest social science research project ever undertaken. Through the WFS more than 400,000 women of reproductive age in more than 40 developing countries and 20 developed countries are providing information on their marriages, fertility, and contraceptive practice. In 1979, five years after the first survey began in Fiji, data from the WFS are answering questions that policy makers and demographers have debated for the last decade.

Among the findings to emerge so far from the published reports of 15 developing countries, four conclusions stand out:

- Fertility is declining at a dramatic rate in many of these countries.
- Age at marriage is increasing in some Asian countries but changing very little in Latin America.
- About half of all married women of reproductive age want no more children, but about half of these women are not using effective methods of family planning.
- More than 80 percent of all married women in every country except Nepal have heard of contraception, but the percentage who have ever used contraception varies widely, from 10 percent in Pakistan to 82 percent in Costa Rica.

These findings and related data come from the various national surveys which together constitute the World Fertility Survey. Each survey is carried out by national government agencies utilizing similar core questionnaires and optional questionnaire modules that permit international comparisons of data. The WFS is administered by the International Statistical Institute in collaboration with the International Union for the Scientific Study of Population. Sir Maurice Kendall is Project Director. The United Nations Fund for Population Activities (UNFPA) and the United States Agency for International Development (USAID) provide financial support and are encouraging further analysis of WFS data.

Declining Fertility

The WFS surveys illustrate declining fertility by comparing the average size of families among ever-married women aged 45 to 49 with the average size of completed families expected for all women now of reproductive age, calculated from current fertility rates. In Costa Rica, for example, women aged 45 to 49 have experienced 7.2 live births during their lives, but younger women are now expected to average only 3.8 births by the time they reach the same age. This is a decline in family size of about 40 percent. In Sri Lanka, women aged 45 to 49 had an average of 6.0 live births, but women of reproductive age now are expected to have only 3.4 births by the time they reach their late forties, an equally sharp decline. (See Figure 1, p. M-75.)

The age when women marry is also changing. Even where memories and age recollections are inaccurate, increasing age at marriage in Asia is documented by comparing the ages when the older and younger women in the survey married. In Korea, for example, women aged 25 to 29 have married three years later than women aged 40 to 44.

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Phyllis T. Piotrow, Ph.D., Director; Helen K. Kolbe, M.S., Co-Director; Ward Rinehart, Editor.

The high percentage of women aged 20 to 24 who were still single at the time of the surveys — over half in South Korea and Sri Lanka, for example — indicates that the mean age at marriage is rising. In five of the six of the Latin American countries surveyed, however, the age at which women marry has not changed, the exception being Panama, where it has increased slightly.

While a delay in marriage can and usually does produce a decline in the crude birth rate, overall the impact of increased age at marriage on fertility is less than might be expected. Women who marry late — that is, in their late teens or early twenties — have more children in the first five years of marriage than women who marry very young and may not even be fully fecund at the time of formal marriage.

A major finding with important implications for family planning program action is the large number of women who want no more children. In 10 of the 15 developing countries reporting so far, more than half of currently married, fecund women do not want more children. The figure is over 60 percent in 6 countries.

Equally important is the high percentage who have heard about some method of family planning — at least 75 percent in 14 of the 15 countries. The pill is best known everywhere and — at the time of these surveys — was the most widely used method in 8 of the 15 countries. Sterilization, mainly female, was not as widely known, but it was the major method in 4 countries and second in 2 others at the time of the surveys.

Unmet Needs for Family Planning

WFS data show two important gaps, or areas of unmet need:

- the gap between knowledge of a method of family planning and use of family planning and
- the gap between desire for no more children and use of family planning.

About 50 percent of the women in most of these countries know about family planning but are not using it; 20 to 30 percent want no more children but are not using effective family planning methods to prevent pregnancy. The gap between the desire to control fertility and the practice of contraception would be even larger if those women who want to space or delay but not entirely terminate their childbearing were included.

One analysis of family planning use and availability based on WFS data concludes that better knowledge of family planning outlets and access to them could substantially reduce unmet need in remote areas such as Nepal and rural portions of Colombia. In Nepal, for instance, 95 percent of exposed women who want no more children and do not know an outlet for services are not using effective contraceptives compared with only 51 percent of those who know of an outlet within two hours' travel.

Other factors which influence knowledge and use of family planning are age, years since marriage, number of living children, rural or urban residence, educational level, and number of children desired. Yet desire to stop childbearing is not confined to any one socioeconomic group. WFS data show that a substantial proportion of women in rural areas, women with no education, and women whose husbands hold low paying jobs also want no more children. These women often have large families already and thus may be especially aware of the burdens of raising a large family on limited resources. Unmet need for family planning, as for other social services, is great among poor, illiterate, and rural families.

The level of unmet need for family planning can be measured in various ways. The most conservative approach, used in this discussion, measures the percentage of all currently married women who (1) are exposed to risk of pregnancy, (2) want no more children, and (3) are not currently using a modern family planning method. Since increases in use of family planning and decreases in the desire for more children go hand in hand, the level of unmet need does not decline immediately as the use of family planning grows. Instead, need continues to grow, reflecting the increasing desire for smaller families. While the greatest need may be in countries like Bangladesh* and Peru, where about 60 percent of the women want no more children but only 6 percent and 15 percent, respectively, are using modern methods, the need is also high in countries like South Korea, where 35 percent are using a modern method but 74 percent want no more children. (See Table 18, p. M-91.)

The implications are important for policy makers and administrators. Data from these WFS surveys show that fertility is declining under very different conditions in different parts of the world. The aspirations and actions of millions of couples are changing at a pace that would once have been thought impossible. By documenting these changes in terms that are internationally comparable, the World Fertility Survey is providing a factual demographic base for policy makers and government officials to establish effective programs.

The following overview by Sir Maurice Kendall, Project Director for the World Fertility Survey, indicates the extent of WFS activities and some of the major findings to date. Appendices provide information on the location of depository libraries, the availability of data tapes, and publications of and about the World Fertility Survey.

End of Editor's Summary

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*In Bangladesh, some women were asked "Do you want to have another child soon?" instead of "Do you want to have another child sometime?" Therefore the Bangladesh figure is not strictly comparable with the figures on the percentage of women wanting no more children for the other 14 countries.

BACKGROUND

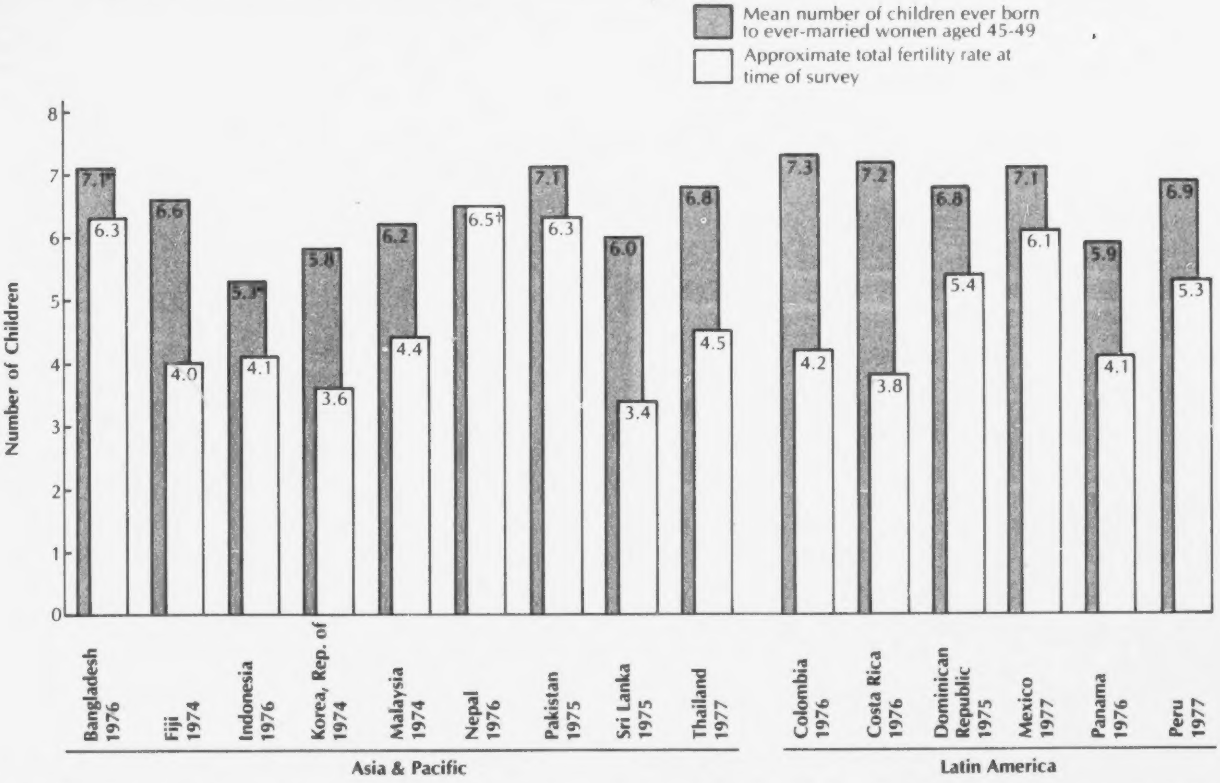
The World Fertility Survey is an international research program designed to assist countries, particularly in the developing world, to carry out scientifically designed sample surveys of human fertility behavior. Officially announced in 1972, the World Fertility Survey is being undertaken by the International Statistical Institute (ISI) with the collaboration of the United Nations and in cooperation with the International Union for the Scientific Study of Population (IUSSP). The WFS is financed by grants to the ISI from the United Nations Fund for Population Activities (UNFPA) and the US Agency for International Development (USAID). Contributions from other countries, notably the United Kingdom and Canada, supplement the funds provided by the two principal donors.

The primary aim of the WFS program is to provide each participating country with accurate demographic data to describe and interpret the fertility of its population. The availability of this information should facilitate national efforts in social, economic, health, and population planning. Two ancillary objectives of the WFS are: (1) to increase the capability for undertaking fertility and other demographic survey research in developing countries, and (2) to provide researchers in participating countries and the world at large the opportunity to make international comparisons of data on fertility levels and differentials, family size ideals, and knowledge and practices of fertility regulation.

Sir Maurice Kendall
Project Director, World Fertility Survey

The WFS studies undertaken in participant countries are generally single round surveys of households so selected as to provide a national probability sample. Eligible women are identified by means of a household screening interview and

Figure 1. Past and Current Fertility Levels in 15 Developing Countries with Published World Fertility Survey Reports



Note: The mean number of children ever born to ever-married women aged 45-49 (green bars) is based on the number of ever-married women, while the total fertility rate (white bars) is based on all women. Thus, to the extent that fewer than all women marry, the fertility decline is exaggerated. See pp. M-84-85 for discussion.

*Figure for women aged 45-49 lower than for women aged 40-44; latter shown.
†Figure for mean number of children corrected after publication of country report. Marital fertility rate shown; total fertility rate not available.

later are interviewed according to a thorough interview schedule known as the individual, or core, questionnaire. Eligible women are generally defined as being ever-married and under the age of 50. The marital criterion has been dropped in many surveys, however, particularly those carried out in the Latin American and Caribbean region, and replaced by a simple age criterion.

The number of women interviewed (or sample size) varies from country to country, generally ranging from 3,000 to 10,000. Sample size depends on such considerations as the size of the country's population and its heterogeneity, the organizational capacities and analytical interests of the country, and the availability of national and international financing.

Table 1. Countries Participating in the World Fertility Survey as of April 1979, by Progress Status

1st Report Complete	1st Report in Progress	Survey in Progress	Possible Participants
AFRICA			
		Cameroun Ghana Ivory Coast Kenya Lesotho Morocco Senegal Sudan Tunisia	Benin[1] Mauritania[1] Nigeria Tanzania Zambia
ASIA			
Bangladesh Fiji Indonesia Korea, Rep. of Malaysia Nepal Pakistan Sri Lanka Thailand		Burma[2] India[3] Iran Philippines	Afghanistan
LATIN AMERICA & CARIBBEAN			
Colombia Costa Rica Dominican Republic Mexico Panama Peru	Guyana Jamaica Trinidad & Tobago Venezuela	Chile[4] Ecuador Haiti Paraguay	Brazil[5] Cuba El Salvador Guatemala[1]
MIDDLE EAST			
	Jordan	Egypt Syria Turkey Yemen A.R.	
DEVELOPED COUNTRIES			
Hungary Japan Netherlands Spain	Belgium Bulgaria Czechoslovakia Denmark Israel UK USA Yugoslavia	Finland France Italy Norway Poland Portugal Rumania Switzerland	Australia Canada New Zealand Sweden[1]

[1] Project to be submitted

[2] Field work in Burma has been postponed.

[3] Seven states in India are taking part using WFS methodology and software.

[4] Field work in Chile has been indefinitely postponed.

[5] Country survey using WFS methodology and software

COUNTRY PARTICIPATION

As of the end of April 1979, 41 developing countries were participating in the WFS program. A further three were scheduled to join before the end of 1979. Yet another seven had shown some interest in conducting surveys under the WFS aegis at some time in the future (see Table 1 and Table 2, p. M-94).

The earliest surveys undertaken in connection with the WFS were in Asia and the Pacific. Attention later focused on Latin America and the Caribbean, followed by Africa and the Middle East. The 41 participating countries are distributed geographically as follows:

Asia and the Pacific	13
Latin America and the Caribbean	14
Africa	9
Middle East	5

As may be seen in Table 1, published reports on survey findings are currently available for 15 developing countries, including 9 from Asia and the Pacific and 6 from Latin America. Reports from another 5 countries are in various stages of preparation, 4 from Latin America and the Caribbean, and one from the Middle East. There are 21 surveys still in the field work or initial data processing stages, including those of all 9 African participants. Although accurate predictions of the progress of work are difficult, it is hoped that between 23 and 27 country reports will be published by the end of 1979 (see Table 2, p. M-94).

The WFS program is principally oriented to developing countries, but developed countries also participate, although without external financial support. The major responsibility for coordination of developed country surveys has been assumed by the United Nations Economic Commission for Europe (UN-ECE), in close collaboration with the WFS. At present there are 20 developed countries at varying stages of work on fertility surveys (see Table 1 and Table 3, p. M-98). Field work has already been completed in 17 countries, and four initial country reports have been published (9, 12, 21, 38).

SURVEY CONTENTS

The WFS has developed a large set of materials to aid and guide countries in carrying out their surveys. These include the household schedule for the screening interview, the individual questionnaire (see p. M-77), various modules which can be incorporated into the individual or household questionnaires, and manuals for national project directors and their staffs.

The Household Schedule

The household schedule is a flexible instrument which can perform various functions, depending on the survey design. In the majority of countries, the design calls for interviewing all eligible women encountered in sample households. In these countries, the household schedule may serve three purposes.

Core Questionnaire

The text of Section 5 on Fertility Regulation, reproduced below from the individual questionnaire, shows how data on fertility regulation and fertility preferences are gathered. For additional information the Family Planning Module can be substituted for this section of the core questionnaire.

SECTION 5. FERTILITY REGULATION

8

501 *INTERVIEWER: TICK APPROPRIATE BOX (SEE 401-405)*

MARRIED AND LIVING WITH HUSBAND ☐1

SEPARATED, WIDOWED OR DIVORCED ☐2 (SKIP TO 524)

502 *INTERVIEWER: TICK APPROPRIATE BOX (SEE 221)*

CURRENTLY PREGNANT ☐1 (SKIP TO 520)

NOT CURRENTLY PREGNANT, OR D.K. ☐2

503 *INTERVIEWER: TICK APPROPRIATE BOX (SEE 315-316)*

HAS USED A CONTRACEPTIVE METHOD ☐1

HAS NEVER USED A CONTRACEPTIVE METHOD ☐2 (SKIP TO 509)

504 Are you or your husband currently using a method to keep you from getting pregnant?

YES ☐1

NO ☐2 (SKIP TO 506)

505 What method are you using?

____

(SKIP TO 513)

IF STERILIZATION MENTIONED IN 504 OR 505 PROBE

You or your husband?

WIFE ☐ (SKIP TO 511)

HUSBAND ☐ (SKIP TO 512)

506 *INTERVIEWER: TICK APPROPRIATE BOX (SEE 211)*

NO LIVE BIRTH ☐1

ONE OR MORE LIVE BIRTHS ☐2

507 Have you or your husband used a method since your (last) child's birth?

YES ☐1

NO ☐2 (SKIP TO 509)

508 What was the last method you used?

____

509 As far as you know, is it physically possible for you and your husband to have a child, supposing you wanted one?

YES ☐1 (SKIP TO 513)

NO ☐2

D.K. ☐3 (SKIP TO 513)

510 Have you had an operation that makes it impossible for you to have any (more) children?

YES ☐1

NO ☐2

511 Was one purpose of that operation to prevent you having any (more) children?

YES ☐1 (SKIP TO 531)

NO ☐2 (SKIP TO 531)

512 Has your husband had an operation that makes it impossible to have children?

YES ☐1 (SKIP TO 531)

NO ☐2 (SKIP TO 531)

513 *INTERVIEWER: TICK APPROPRIATE BOX (SEE 211)*

NO LIVE BIRTH ☐1

ONE OR MORE LIVE BIRTHS ☐2 (SKIP TO 517)

514 Do you want to have any children?

YES ☐1

NO ☐2 (SKIP TO 522)

UNDECIDED ☐3 (SKIP TO 522)

515 Would you prefer your first child to be a boy or a girl?

BOY ☐1 GIRL ☐2 EITHER ☐3

OTHER ANSWER ________________ (SPECIFY)

516 How many children in all do you want to have?

________________ (NUMBER)

(SKIP TO 522)

517 Do you want to have another child sometime?

YES ☐1

NO ☐2 (SKIP TO 522)

UNDECIDED ☐3 (SKIP TO 522)

518 Would you prefer your next child to be a boy or a girl?

BOY ☐1 GIRL ☐2 EITHER ☐3

OTHER ANSWER ________________ (SPECIFY)

519 How many more children do you want to have?

________________ (NUMBER)

(SKIP TO 522)

520 Do you want to have another child sometime, in addition to the one you are expecting?

YES ☐1

NO ☐2 (SKIP TO 522)

UNDECIDED ☐3 (SKIP TO 522)

521 How many more children do you want to have, after the one you are expecting?

________________ (NUMBER)

522 *INTERVIEWER: TICK APPROPRIATE BOX (SEE 315-316)*

HAS USED A CONTRACEPTIVE METHOD ☐1 (SKIP TO 531)

HAS NEVER USED A CONTRACEPTIVE METHOD ☐2

523 Do you think you and your husband may use any method at any time in the future so that you will not become pregnant?

YES ☐1 (SKIP TO 531)

NO ☐2 (SKIP TO 531)

UNDECIDED ☐3 (SKIP TO 531)

524 *INTERVIEWER: TICK APPROPRIATE BOX (SEE 221)*

CURRENTLY PREGNANT ☐1 (SKIP TO 531)

NOT CURRENTLY PREGNANT ☐2

D.K. WHETHER PREGNANT ☐3 (SKIP TO 527)

525 Have you had an operation that makes it impossible for you to have any (more) children?

YES ☐1

NO ☐2 (SKIP TO 527)

526 Was one purpose of that operation to prevent you having any (more) children?

YES ☐1 (SKIP TO 531)

NO ☐2 (SKIP TO 531)

527 *INTERVIEWER: TICK APPROPRIATE BOX (SEE 315-316)*

HAS USED A CONTRACEPTIVE METHOD ☐1

HAS NEVER USED A CONTRACEPTIVE METHOD ☐2 (SKIP TO 531)

528 *INTERVIEWER: TICK APPROPRIATE BOX (SEE 211)*

NO LIVE BIRTH ☐1

ONE OR MORE LIVE BIRTHS ☐2

529 Did you or your husband use any method at any time after the birth of your (last) child, so that you would not become pregnant?

YES ☐1

NO ☐2 (SKIP TO 531)

530 What was the last method you used so that you would not become pregnant?

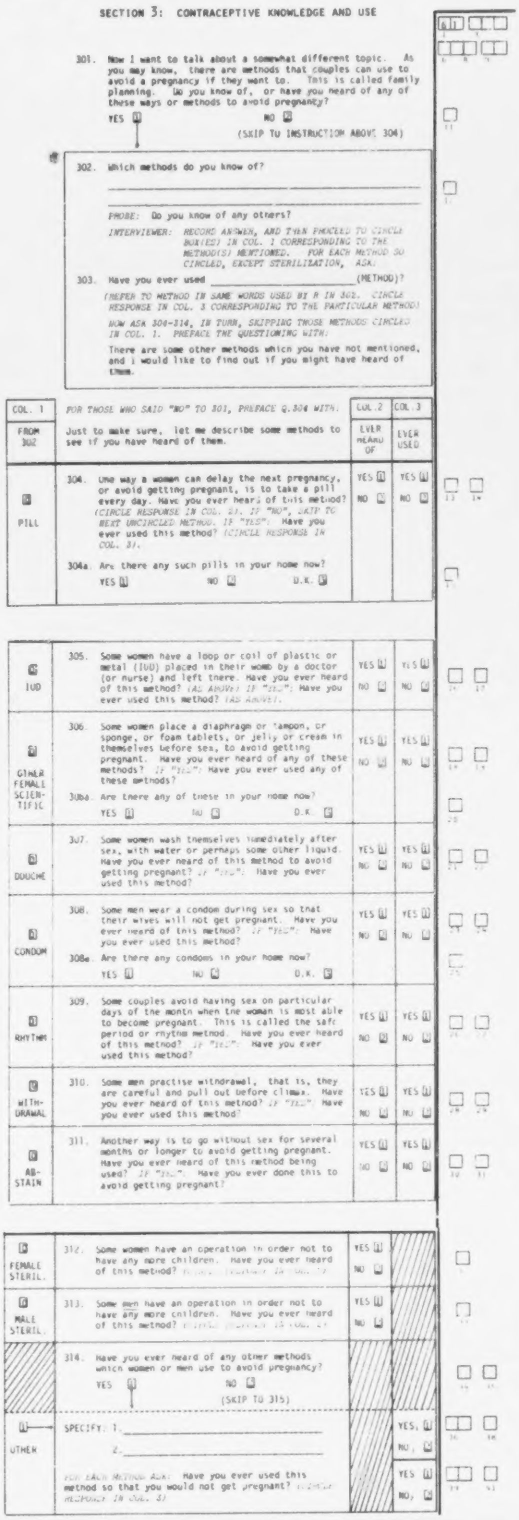
____

531 If you could choose exactly the number of children to have in your whole life, how many children would that be?

________________ (NUMBER)

Family Planning Module: Contraceptive Knowledge and Use

The excerpt, reproduced below, from the Family Planning Module, shows how data on contraceptive knowledge and use are gathered.



SECTION 3: CONTRACEPTIVE KNOWLEDGE AND USE

301. Now I want to talk about a somewhat different topic. As you may know, there are methods that couples can use to avoid a pregnancy if they want to. This is called family planning. Do you know of, or have you heard of any of these ways or methods to avoid pregnanty?

YES 1 NO 2 (SKIP TO INSTRUCTION ABOVE 304)

302. Which methods do you know of?

PROBE: Do you know of any others?

INTERVIEWER: RECORD ANSWER, AND THEN PROCEED TO CIRCLE BOX(ES) IN COL. 1 CORRESPONDING TO THE METHOD(S) MENTIONED. FOR EACH METHOD SO CIRCLED, EXCEPT STERILIZATION, ASK:

303. Have you ever used ______________(METHOD)?

(REFER TO METHOD IN SAME WORDS USED BY R IN 302. CIRCLE RESPONSE IN COL. 3 CORRESPONDING TO THE PARTICULAR METHOD)

NOW ASK 304-314, IN TURN, SKIPPING THOSE METHODS CIRCLED IN COL. 1. PREFACE THE QUESTIONING WITH:

There are some other methods which you have not mentioned, and I would like to find out if you might have heard of them.

COL. 1	*FOR THOSE WHO SAID "NO" TO 301, PREFACE Q.304 WITH:*	COL. 2	COL. 3
FROM 302	Just to make sure, let me describe some methods to see if you have heard of them.	EVER HEARD OF	EVER USED
PILL	304. One way a women can delay the next pregnancy, or avoid getting pregnant, is to take a pill every day. Have you ever heard of this method? *(CIRCLE RESPONSE IN COL. 2). IF "NO", SKIP TO NEXT UNCIRCLED METHOD. IF "YES":* Have you ever used this method? *(CIRCLE RESPONSE IN COL. 3).* 304a. Are there any such pills in your home now? YES 1 NO 2 D.K. 3	YES 1 NO 2	YES 1 NO 2
IUD	305. Some women have a loop or coil of plastic or metal (IUD) placed in their womb by a doctor (or nurse) and left there. Have you ever heard of this method? *(AS ABOVE) IF "YES":* Have you ever used this method? *(AS ABOVE).*	YES 1 NO 2	YES 1 NO 2
OTHER FEMALE SCIENTIFIC	306. Some women place a diaphragm or tampon, or sponge, or foam tablets, or jelly or cream in themselves before sex, to avoid getting pregnant. Have you ever heard of any of these methods? *IF "YES":* Have you ever used any of these methods? 306a. Are there any of these in your home now? YES 1 NO 2 D.K. 3	YES 1 NO 2	YES 1 NO 2
DOUCHE	307. Some women wash themselves immediately after sex, with water or perhaps some other liquid. Have you ever heard of this method to avoid getting pregnant? *IF "YES":* Have you ever used this method?	YES 1 NO 2	YES 1 NO 2
CONDOM	308. Some men wear a condom during sex so that their wives will not get pregnant. Have you ever heard of this method? *IF "YES":* Have you ever used this method? 308a. Are there any condoms in your home now? YES 1 NO 2 D.K. 3	YES 1 NO 2	YES 1 NO 2
RHYTHM	309. Some couples avoid having sex on particular days of the month when the woman is most able to become pregnant. This is called the safe period or rhythm method. Have you ever heard of this method? *IF "YES":* Have you ever used this method?	YES 1 NO 2	YES 1 NO 2
WITH-DRAWAL	310. Some men practise withdrawal, that is, they are careful and pull out before climax. Have you ever heard of this method? *IF "YES":* Have you ever used this method?	YES 1 NO 2	YES 1 NO 2
AB-STAIN	311. Another way is to go without sex for several months or longer to avoid getting pregnant. Have you ever heard of this method being used? *IF "YES":* Have you ever done this to avoid getting pregnant?	YES 1 NO 2	YES 1 NO 2
FEMALE STERIL.	312. Some women have an operation in order not to have any more children. Have you ever heard of this method? *(CIRCLE RESPONSE IN COL. 2)*	YES 1 NO 2	
MALE STERIL.	313. Some men have an operation in order not to have any more children. Have you ever heard of this method? *(CIRCLE RESPONSE IN COL. 2)*	YES 1 NO 2	
	314. Have you ever heard of any other methods which women or men use to avoid pregnancy? YES 1 NO 2 (SKIP TO 315)		
OTHER	SPECIFY: 1. ______________ 2. ______________ *FOR EACH METHOD ASK:* Have you ever used this method so that you would not get pregnant? *(CIRCLE RESPONSE IN COL. 3)*		YES, 1 NO, 2 YES 1 NO, 2

First, it provides the listing of household members that is essential to identifying eligible respondents for the individual questionnaire. Second, by gathering data on such matters as age, sex, and marital status of household members, it provides the denominators necessary for calculating certain demographic statistics as well as the opportunity to analyze nuptiality. Third, it provides the possibility of collecting useful contextual data on factors that may relate to fertility, such as ownership of modern objects, membership in cultural or ethnic groups, and housing conditions.

In countries lacking good systems of vital registration, the household schedule may also serve to gather data on fertility. This is accomplished by appending questions on fertility to the household schedule and administering it to a sample three or four times the size necessary to obtain the desired number of eligible women for the individual questionnaire. The goal in such cases is to obtain more precise estimates of fertility, particularly current fertility, than could be provided by the smaller sample for the individual questionnaire. The household schedule becomes, in effect, a mini-census, ideal for applying various types of fertility analysis.

The Individual Questionnaire

The recommended individual, or core, questionnaire of the WFS consists of seven sections of questions (in 21 pages) as follows:

Section 1. Respondent's Background
Section 2. Maternity History
Section 3. Contraceptive Knowledge and Use
Section 4. Marriage History
Section 5. Fertility Regulation
Section 6. Work History
Section 7. Current (or Last) Husband's Background

The questions in the core questionnaire are designed to provide the following basic social, economic, demographic, and fertility data:

Section 1. Respondent's Background. Residence and migration status, size of community in which respondent spent her formative years, age, education, and ability to read. Optional questions cover religion, language, and ethnic group.

Section 2. Maternity History. Number of live births by sex and date of occurrence, incidence of pregnancy wastage, infant and child mortality, prevalence and duration of lactation for last and penultimate live births, whether currently pregnant and, if so, expected birth date and sex preference.

Section 3. Contraceptive Knowledge and Use. Knowledge and use of contraceptive methods, including perceived availability of key methods of contraception.

Section 4. Marriage History. Complete marital history, dates of initiation and termination of unions (used as proxy for length of exposure to risk of pregnancy), adapted as necessary for nonlegal and informal unions.

Section 5. Fertility Regulation. Capacity and desire for more children, the number desired and preference concerning the sex of the next child. For ever-users of contraception, information on current use or use since last pregnancy; for never-users, information on intention to use in the future. (For excerpts, see p. M-77.)

Section 6. Work History. Detailed occupational information on respondent's work, both before and after marriage.

Section 7. Current (or Last) Husband's Background. His education, ability to read, type of community in which formative years were spent, occupation, and age.

The individual questionnaire is regarded as a core. Virtually all countries want to add to it in one way or another, and some wish to alter one or more sections to suit their needs.

Fertility-Related Modules

As an aid to countries wishing to investigate certain topics in greater depth than that afforded by the core questionnaire, various modules or sets of questions have been developed by the WFS staff and consultants. Each module consists of a series of questions on a particular topic and can be added, either in part or in total, to the core questionnaire. The modules deal with two kinds of variables: those which affect fertility directly and those which may affect fertility indirectly.

The modules dealing principally with variables which affect fertility directly are:

Fertility Regulation Module. This is an expansion of Section 5 of the core questionnaire with questions on contraceptive use in the last closed and open birth intervals,* including a question on whether the last birth was wanted.

Family Planning Module. This module is usually used in conjunction with the Fertility Regulation Module. Questions deal with visits to places where family planning advice and supplies may be obtained, satisfaction with service, when contraception was started and which method, approval/disapproval of contraception by never-users, and reasons for discontinuation of last contraceptive method.

Abortion Module. Questions are added to Section 2 of the core questionnaire to probe for infertile pregnancies in each live birth interval to determine whether any spontaneous abortion occurred. Questions are added to Section 3 to measure the respondent's attitudes toward induced abortion. The module is not recommended for use in countries where anti-abortion laws are rigorously enforced or where the topic of abortion is politically sensitive.

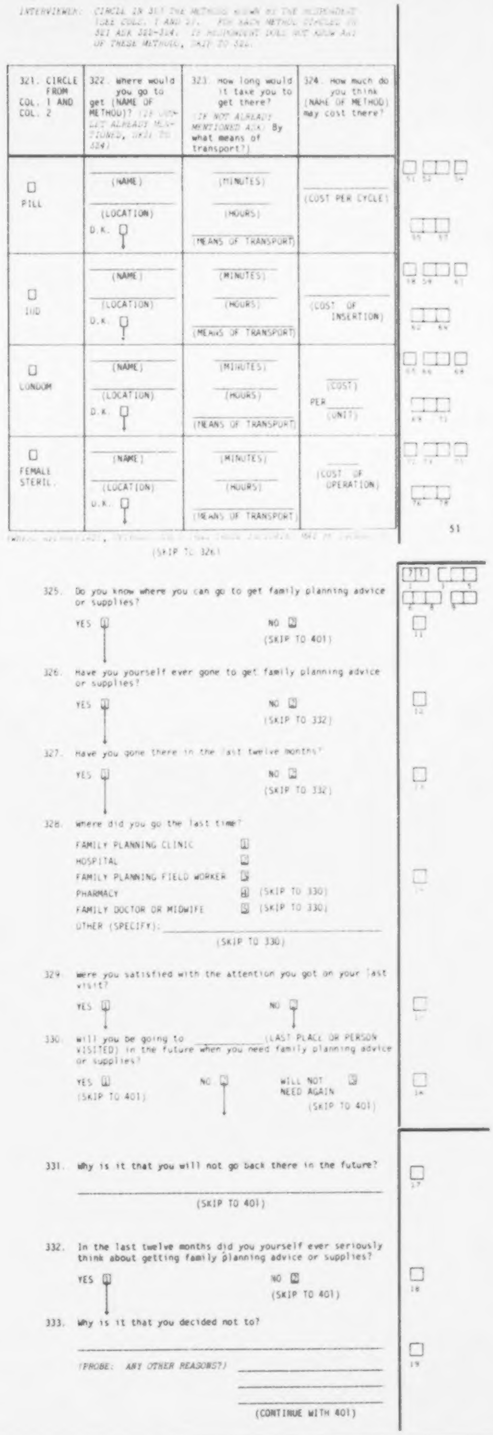
Factors Other than Contraception Affecting Fertility. This module measures the effect of "intermediate" variables, which lie causally between fertility and the cultural, social, and economic milieu. Questions treat lactation, postpartum amenorrhea, abstinence, and temporary separation of partners (three months or more) in the penultimate and last pregnancy intervals, coital frequency in the last seven days, and age at menarche and menopause.

Modules which deal principally with variables which may affect fertility indirectly are:

Community-level Variables. This module deals with variables which characterize a community and affect most of the persons living in it, such as presence or absence of a hospital, transportation and communication facilities, health facilities, family planning facilities, education, and agricultural and/or industrial development levels. The collection of community-level data is a supplementary investigation which requires conducting interviews with community leaders, consulting reference works, and/or simply observing the community itself. The module contents are always adapted to the needs of the country.

Family Planning Module: Availability

The excerpt, reproduced below, from the Family Planning Module, shows how data on family planning services and availability are gathered. Questions 321 to 324, on location of service outlets, distance, and perceived costs of various methods, have recently been added to the core questionnaire as well as being continued in the Family Planning Module.



INTERVIEWER: CIRCLE IN 321 THE METHODS KNOWN BY THE RESPONDENT (SEE COLS. 1 AND 2). FOR EACH METHOD CIRCLED IN 321 ASK 322-324. IF RESPONDENT DOES NOT KNOW ANY OF THESE METHODS, SKIP TO 326.

321. CIRCLE FROM COL. 1 AND COL. 2	322. Where would you go to get (NAME OF METHOD)? *(IF OUTLET ALREADY MENTIONED, SKIP TO 324)*	323. How long would it take you to get there? *(IF NOT ALREADY MENTIONED ASK)* By what means of transport?)	324. How much do you think (NAME OF METHOD) may cost there?
☐ PILL	(NAME) (LOCATION) D.K. ☐	(MINUTES) (HOURS) (MEANS OF TRANSPORT)	(COST PER CYCLE)
☐ IUD	(NAME) (LOCATION) D.K. ☐	(MINUTES) (HOURS) (MEANS OF TRANSPORT)	(COST OF INSERTION)
☐ CONDOM	(NAME) (LOCATION) D.K. ☐	(MINUTES) (HOURS) (MEANS OF TRANSPORT)	(COST) PER (UNIT)
☐ FEMALE STERIL.	(NAME) (LOCATION) D.K. ☐	(MINUTES) (HOURS) (MEANS OF TRANSPORT)	(COST OF OPERATION)

[illegible]

(SKIP TO 326)

325. Do you know where you can go to get family planning advice or supplies?

YES 1 — NO 2 (SKIP TO 401)

326. Have you yourself ever gone to get family planning advice or supplies?

YES 1 — NO 2 (SKIP TO 332)

327. Have you gone there in the last twelve months?

YES 1 — NO 2 (SKIP TO 332)

328. Where did you go the last time?

FAMILY PLANNING CLINIC 1
HOSPITAL 2
FAMILY PLANNING FIELD WORKER 3
PHARMACY 4 (SKIP TO 330)
FAMILY DOCTOR OR MIDWIFE 5 (SKIP TO 330)
OTHER (SPECIFY): ____________
(SKIP TO 330)

329. Were you satisfied with the attention you got on your last visit?

YES 1 — NO 2

330. Will you be going to ________ (LAST PLACE OR PERSON VISITED) in the future when you need family planning advice or supplies?

YES 1 (SKIP TO 401) — NO 2 — WILL NOT NEED AGAIN 3 (SKIP TO 401)

331. Why is it that you will not go back there in the future?

____
(SKIP TO 401)

332. In the last twelve months did you yourself ever seriously think about getting family planning advice or supplies?

YES 1 — NO 2 (SKIP TO 401)

333. Why is it that you decided not to?

____
(PROBE: ANY OTHER REASONS?) ____________
(CONTINUE WITH 401)

---

*A closed birth interval is the time between a birth and the next birth. An open interval is the time between the last birth and the date of the interview.

General Mortality Module. Many countries with deficient systems for the recording of vital events may be interested in measuring mortality in addition to fertility. This module is added to the household schedule to obtain information on deaths of household members in the 24 months preceding the interview, survival of first spouse, survival of parents, whether the person being interviewed is an eldest living offspring, and survival of offspring of ever-married women.

Economic Variables. Three modules have been developed which deal in turn with family income, asset holdings, and economic costs and benefits of children. These modules are always adapted to the needs of the country.

The Use of Questionnaire Modules

Most countries so far enrolled in the program have chosen to adopt two or more WFS questionnaire modules (see Table 2). Virtually all countries have opted for one of the three fertility control modules: Family Planning, Fertility Regulation, or Factors Other than Contraception Affecting Fertility. In Asia and Latin America wide use has been made of the Fertility Regulation and/or Family Planning modules. All nine African countries have used the module on Factors Other than Contraception Affecting Fertility, except Morocco, which has used the Fertility Regulation and Family Planning modules. Parts of the Abortion Module have been used in almost half of the participating countries. Much less use has been made of the modules dealing with variables indirectly affecting fertility, although the 15 countries which have collected community-level data are well distributed geographically. (See Table 4.)

TECHNICAL ASSISTANCE

The principal function of the WFS headquarters professional staff, based in London and now numbering more than 40, is to assist developing countries to carry out and analyze their fertility surveys. Assistance is provided at all stages, including questionnaire and sample designs, interviewer training, field work, coding and editing, data processing, and report writing.

Initially, various manuals were developed by WFS staff not only to insure the collection of high quality data, but also to aid personnel in the participating countries to establish a survey organization, set standards for the training of survey personnel, carry out the field work, and process and analyze the data as efficiently as possible. Some of the manuals, such as the *Survey Organization Manual, Manual on Sample Design,* and *Training Manual* are used for information and reference. Other manuals, such as the *Interviewers' Instructions, Supervisors' Instructions,* and *Guidelines for Data Processing,* are adapted to fit local survey conditions and reprinted to be used in training and data processing (40-51).

Figure 2. A survey interview in progress in Bhairawa, Nepal.
(Photo courtesy of V.C. Chidambaram)

The amount and nature of technical assistance required by individual countries varies a great deal, as might be expected. In general, the heaviest inputs of assistance are required at the data processing and report-writing stages. In this connection, the WFS has developed several innovations that have permitted participating countries to produce their published reports of findings less than 18 months after the completion of field work. This exceptionally rapid publication of survey results permits analysts and government officials to deal with data that are still current and relevant to policy and program needs. These innovations, described below, relate primarily to data processing.

Data Processing

Two stages of data processing must be completed before the first country report can be written. The first is data editing, or cleaning; the second is the production of statistical tables. For years the least-developed phase of the processing of social surveys has been that of data editing. Fortunately, at about the time the WFS recognized a need for the development of a general-purpose editing package for computer use, CELADE (the UN regional Demographic Center for Latin America) was engaged in developing just such a package — named CONCOR. The WFS has worked closely with CELADE in adapting and improving the various components of CONCOR. As a result of the use of CONCOR, the interval between the end of field work and the start of tabulations has been reduced from a range of 10 to 16 months in the case of early WFS surveys to an average now of 4 to 6 months. Since CONCOR is a general-

Table 4. Number of Countries Which Have Used Questionnaire Modules by Geographic Region and Module

Region	Core Questionnaire	Family Planning	Fertility Regulation	Abortion	Factors Other*	Community	Economic	General Mortality
Africa	9	4	1	3	8	5	0	3
Asia & Pacific	13	7	10	8	3	4	2	1
Latin America	14	7	9	5	3	2	1	3
Middle East	5	2	4	4	3	4	1	3
TOTAL	41	20	24	20	17	15	4	10

*Factors Other than Contraception Affecting Fertility ized system, once installed in a country it can be used for cleaning other surveys and censuses.

For the production of tables to be included in country reports, the WFS recommends using COCENTS, a tabulation package developed by the US Bureau of the Census. Unique advantages of COCENTS are its adaptability to many different computers and the fact that its output may be photographed directly for publication. A major disadvantage in comparison with more sophisticated packages is the amount of programming required for even the simplest tables. As an answer to this problem the WFS developed a program called COCGEN (for COCents GENerator), which permits the preparation of tables in a much simplified form and prepares the parameters for later use by the COCENTS program. As a result, the time required for programming and running tabulations has been cut, in the case of some countries, to as little as three months.

As a further contribution to the state of the art and as an aid to analysts in interpreting survey results, or, more precisely, to help them avoid attributing significance to insignificant results, the WFS has developed a program for the calculation of sampling errors and associated statistics. Named CLUSTERS (for Computation and Listing of Useful STatistics on ERrors of Sampling), the program has powerful recoding routines, is easy to set up, and can be run on relatively small computers. Country reports, as standard practice, now contain an appendix presenting detailed sampling error calculations.

First Country Reports

Barring some exceptional cases, first country reports on survey findings are prepared in-country by the national survey staff. Technical assistance is provided by staff from London headquarters or by special consultants as needed. To guide countries in preparing their reports, the WFS has prepared a document entitled *Guidelines for Country Report No. 1* (47). Specifications are set out for some 200 tables, along with guidelines and cautions concerning how these tables are to be interpreted. A companion document, *Guidelines for Data Processing*, currently in draft form, describes how variables used in the analysis are to be defined and formulated (51).

By introducing an element of standardization into the production of first country reports, the WFS has helped countries to publish reports, consisting of 400 to 500 pages of tables and 100 to 150 pages of text, within a 12- to 18-month period after the end of field work. As noted earlier, 15 reports have thus far been published and another 5 are in progress. Although of limited analytical content, these reports contain a wealth of data useful to demographers, social scientists, and program and policy planners throughout the world.

Further Analysis of the Data

To insure adequate use and application of the survey data, the WFS encourages countries to prepare projects for further analysis of their data. Both USAID and UNFPA have declared their willingness to finance such projects. (See box at right). The principal problem faced by the WFS is the provision of technical assistance in the formulation and execution of sophisticated analysis projects. Headquarters manpower is already fully occupied in providing assistance to countries in carrying out surveys and preparing the first reports. As a partial solution to this problem it was decided that the WFS should publish a series of illustrative analyses on important topics. These are supplemented by a series of Technical Bulletins containing expositions of specific substantive and methodological issues arising in data analysis.

A set of 12 topics has been identified for illustrative analyses. The analyses are being carried out by both WFS staff and invited experts. The studies will use country data now available and will be published in monograph form. They are intended to serve as models of the basic research possible with WFS data. The topics selected for illustrative analysis, along with the country data analyzed and the investigators involved, are as follows:

1. **Fertility levels and trends estimated from birth history data (Thailand)**
   Investigator: WFS Central Staff
2. **Indirect methods of estimating current fertility levels (Colombia)**
   Investigator: John Hobcraft, University of Southampton
3. **Life table analysis of birth intervals (Colombia)**
   Investigator: WFS Central Staff

DATA AND FINANCIAL SUPPORT FOR FURTHER ANALYSIS

The World Fertility Survey and its sponsors encourage responsible research institutions in both the developing and developed nations to undertake analytical projects utilizing one or more country data tapes. In particular, there is an urgent need for more analysis of issues relevant to public policy, such as the determinants of differential fertility and contraceptive behavior and the consequences of recent fertility trends for development.

WFS country tapes are being converted to standard recode variable tapes, on which the location of variables is standard. These tapes will greatly facilitate intercountry comparisons. The availability of edited country tapes and standard recode tapes is shown in the table on p. M-94.

The data essentially belong to the countries and therefore can be released to outside organizations or individuals only with the permission of and subject to the conditions specified by the country concerned. Copies of tapes can be obtained by submitting a written request plus a detailed statement of the proposed research to WFS headquarters in London (World Fertility Survey, International Statistical Institute, 35-37 Grosvenor Gardens, London SW1W OBS, United Kingdom). WFS will refer all proposals to the countries concerned for their clearance, but in doing so it will not necessarily pass any judgment on the proposals unless requested to do so by the countries. If any country so desires, the results of the analysis would have to be sent to it prior to publication.

With respect to financial assistance, the US Agency for International Development (USAID) has provided WFS with funds to aid outside institutions. Requests for financial assistance should be sent to WFS, where they will be evaluated and, if sound, forwarded to USAID in Washington for final approval.

The UN Fund for Population Activities (UNFPA) will consider funding analysis projects originating in developing countries. Such proposals should be submitted to the appropriate UNFPA coordinator, who will forward them to UNFPA headquarters in New York.

4. **Age at marriage and fertility (Thailand)**
   Investigator: WFS Central Staff
5. **The role of contraceptive sterilization in family limitation (Panama)**
   Investigator: Charles Westoff, Princeton University
6. **Socioeconomic determinants of the use of contraception (Thailand)**
   Investigator: WFS Central Staff
7. **Breast-feeding and its impact on fertility (Nepal)**
   Investigator: WFS Central Staff
8. **Socioeconomic determinants of fertility preferences (Sri Lanka)**
   Investigator: Thomas W. Pullum, University of Washington
9. **Use of contraception as related to fertility preferences (Colombia)**
   Investigator: Corporación Centro Regional de Población
10. **Family structure and fertility (Sri Lanka)**
    Investigator: Jack Caldwell, Australian National University
11. **Socioeconomic determinants of cumulative fertility (Sri Lanka)**
    Investigator: WFS Central Staff
12. **Levels and differentials in infant and child mortality (Colombia)**
    Investigator: Jorge Somoza, Centro Latinoamericano de Demografía

It is intended that the majority, if not all, of these studies will be completed and published during 1979.

A series of 10 Technical Bulletins is being prepared to supplement the illustrative analyses. Some deal with already known and used techniques of analysis, while others are quite innovative. The titles and authors of these Bulletins are the following:

Figure 3. The Survey Director of the Nepal Fertility Survey, Jayanti Tuladhar, makes his way on foot to survey pre-test areas in Gorkha village, December 1975. The village is eight hours' walk from the nearest point accessible by motor vehicle. (Photo courtesy of V.C. Chidambaram)

1. **Some notes on statistical problems likely to arise in the analysis of WFS surveys**
   Author: Sir Maurice Kendall
2. **Path analysis and model building**
   Authors: Sir Maurice Kendall and C. O'Muircheartaigh
3. **Standardization**
   Author: T. Pullum
4. **Suggested fertility measures from the WFS core questionnaire**
   Author: T. Pullum
5. **Generalized linear models for cross-classified data from the WFS**
   Author: R. Little
6. **Birth interval analysis**
   Author: K. Srinivasan
7. **Estimation of fertility trends from birth data**
   Author: W. Brass
8. **Results of the evaluation of the Fiji survey data**
   Authors: A. Coale and J. Potter
9. **The own-children method**
   Author: L.-J. Cho
10. **Life table methods**
    Author: D. Smith

Bulletins 1 to 3 and 5 have been published (71-74), Bulletins 4, 6, and 7 are under discussion, and Bulletins 8 to 10 are being drafted.

These Technical Bulletins, together with the illustrative analyses, are expected to provide sound guidance for countries interested in pursuing further analysis of their survey data. To date only a handful of countries have submitted projects for further analysis to the funding agencies. With the publication of the illustrative analyses, enthusiasm for in-depth analysis of the WFS surveys is expected to increase.

HIGHLIGHTS OF WFS DATA IN 15 COUNTRIES

Because of the international scope, promise, and impact of the World Fertility Survey, great interest has been aroused. The first findings have been awaited with curiosity. One of the principal aims of this overview is to highlight findings from the first 15 published reports on the topics of past and present fertility levels, preferences concerning fertility, age at marriage and marital stability, and knowledge, availability, and use of contraceptive methods. These data are drawn from nine countries in the Asia and Pacific region (Bangladesh, Fiji, Indonesia, South Korea, Malaysia, Nepal, Pakistan, Sri Lanka, and Thailand) and from six countries in Latin America (Colombia, Costa Rica, the Dominican Republic, Mexico, Panama, and Peru).*

Declining Fertility

Data from the World Fertility Survey and other sources indicate that a dramatic decline in fertility levels is underway in many parts of the developing world. Among the 15 countries studied here, there are only three possible exceptions: Bangladesh, Nepal, and Pakistan. In the other 12 countries fertility is clearly declining. Perhaps the best way of illustrating this in summary form is to compare the number of children women of ages 45 to 49 have had in their lives, representing past fertility, with the current total fertility rate (TFR) estimated from survey data (see Figure 1). The TFR essentially indicates what completed family size will be if the fertility rates now prevailing among women of all ages are maintained. Some caution is necessary, as the TFR is based on all women while the other figures are based on ever-married women, but in most countries 98 percent or more of women 45 to 49 have been married. In these cases the difference in the choice of denominators has little effect on the comparison. In some countries — Sri Lanka, Thailand, Mexico, Panama, and Peru, where about 95 percent of women 45 to 49 have been married, and Costa Rica, where about 90 percent have been married — the difference in denominators exaggerates somewhat the extent of the fertility decline.

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*In Costa Rica and Panama the women surveyed were aged 20 to 49; in all other countries, aged 15 to 49.

The most dramatic case of recent, sustained, and appreciable fertility decline is the case, already well-documented, of Costa Rica. There, ever-married women 45 to 49 have had a mean of 7.2 live births, while the current total fertility rate is just 3.8. Almost equally impressive, but less well known, are the cases of Colombia and Thailand. For Colombia the figures are 7.3 compared with 4.2; for Thailand, 6.8 compared with 4.5. The WFS has also gathered evidence of fertility declines in countries where such declines had not been identified previously. In the Dominican Republic the respective figures are 6.8 and 5.4, and in Peru, where family planning until recently was positively discouraged and where there is still no national family planning program (even though the use of traditional contraceptive methods has been widespread), the figures are 6.9 and 5.3. The existence of family planning programs does not seem to be a prerequisite for the onset of a fertility decline in situations like that of Peru, although clearly such programs have played an important role in lowering fertility in countries like Costa Rica and Korea and might have made possible an even more rapid decline in Peru had they existed there.

Fertility Preferences

Changes in fertility preferences are also documented in the WFS data. Of the currently married fecund women who were questioned, about half want no more children. This figure ranges from more than 60 percent in Bangladesh,* South Korea, Sri Lanka, Colombia, Panama, and Peru to about 30 percent in Nepal (see Table 5).

Table 5. Percentage of Currently Married Fecund Women Who Want No More Children and of Those with at Least One Birth or Currently Pregnant Who Did Not Want Last Child or Current Pregnancy

	% wanting no more children	% not wanting last child or current pregnancy
ASIA & PACIFIC		
Bangladesh	61*	NA
Fiji	50	27.7
Indonesia	39	16.8**
Korea, Rep. of	72	36.7
Malaysia	43	NA
Nepal	30	NA
Pakistan	49	NA
Sri Lanka	61	33.9
Thailand	57	NA
LATIN AMERICA		
Colombia	61	42.0
Costa Rica	52	28.3
Dominican Republic	45	NA
Mexico	57	NA
Panama	63	33.3
Peru	61	46.1

NA = not available

*Some women were asked: "Do you want another child soon?"

**Ever-married women as base

Source: First Country Reports. For Column 1: Table 3.1.1, except Fiji, G1; Indonesia: 4.1.1; Thailand, 3.1.1. For Column 2: Table 3.1.4, except Fiji, G30; Indonesia, 4.1.3.

Even more significant may be the number of currently married women with at least one birth or currently pregnant who did not want their last child or current pregnancy. Where data are available, they show that, except in Indonesia, more than one-quarter of these women did not want their last child or current pregnancy (see Table 5).

In a further analysis of WFS data, James Brackett, Reimert Ravenholt, and John Chao note that the desire for no more children is substantial in all socioeconomic groups, including the rural and the least educated (86). Of course, rural and uneducated women tend to have large families, and this is indeed one reason they want no more children. As Table 6

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*In Bangladesh, some women were asked, "Do you want to have another child soon?" instead of "Do you want to have another child sometime?"

Table 6. Percentage of Currently Married Fecund Women with Four Children[a] Who Want No More, by Residence, Education, and Husband's Occupation

	Residence			Education			Husband's Occupation			
	All	Rural	Urban	None	Primary	Secondary	Agricultural	Unskilled	Semi-skilled	Professional/ Managerial
ASIA & PACIFIC										
Bangladesh[b]	77	76	87	75	81	98	78	74[c]		71
Fiji	67	60	78	72	65	71[d]	59	79	69	68[e]
Indonesia	57	56	66	54	58	75[d]	58	57		65[e]
Korea, Rep. of	92	88	95	89	92	96	88	98	91	100
Malaysia	52	46	76	49	54	64	46	54[f]		55
Nepal	58	58[g]	58[h]	58	(53)	(100)	NA	NA	NA	NA
Pakistan[i]	69	67	76	68	70	87[d]	NA	NA	NA	NA
Sri Lanka	87	86	91	80	85	92	84	92	92	83
Thailand	81	82	75	84	80[j]	(86)[k]	80	(100)	84	(92)
LATIN AMERICA										
Colombia	79	76	81	78	78	81	NA	NA	NA	NA
Costa Rica	68	64	61	(82)	64	75	NA	NA	NA	NA
Dominican Republic	62	63	59	(50)	64	(50)	53	(71)	66	(75)
Panama	82	79	84	73[l]	79	88	74	(50)	86	88[e]

NA = not available

Note: Parentheses indicate n<25.

[a] Including current pregnancies

[b] Some women were asked: "Do you want another child soon?"

[c] "Other Occupation"

[d] Secondary and higher

[e] Includes clerical

[f] "Other" and "Production and Related"

[g] Mountain

[h] Hill and terai

[i] Frequencies not available

[j] Grades 1-4

[k] Grades 5-10

[l] Less than 4 years and illiterate

Source: First Country Reports. Data from Tables 3.1.1, 3.1.3, except Fiji, G1, G3, G4; Indonesia, 4.1.1, 4.1.2; Thailand, 3.1.1, 3.1.2.

Table 7. Preferences Regarding Fertility

	Percentage of women with two children who want no more*	Of women who express preference, percentage who want a boy next*	Percentage of women who do not care if next is a boy or a girl*
ASIA & PACIFIC			
Bangladesh	67	98	32
Fiji	36	69	NA
Indonesia	35	61	51
Korea, Rep. of	71	99	19
Malaysia	25	NA	NA
Nepal	27	97	27
Pakistan	35	NA	NA
Sri Lanka	60	88	29
Thailand	51	50	31
LATIN AMERICA			
Colombia	53	47	19
Costa Rica	35	51	61
Dominican Republic	NA	NA	NA
Mexico	41	65	48
Panama	NA	39	29
Peru	50	62	41

NA = not available

Note: Women sterilized for contraceptive purposes are treated as fecund women who want no more children.

*Restricted to currently married nonpregnant fecund women with one living son and one living daughter

Source: First Country Reports. For Column 1: Table 3.2.1, except Bangladesh, Korea, 3.4.1; Fiji, G5; Indonesia, 3.4.1; Thailand, 3.2.1A. For Column 2: Table 3.2.1, except Bangladesh, Korea, Mexico, Peru, 3.4.1; Colombia, Costa Rica, 3.2.2; Fiji, G7; Indonesia, 4.4.1. For Column 3: Table 3.2.3, except Bangladesh, Korea, Colombia, Mexico, Peru, 3.4.3; Indonesia, 7.5.

shows, however, among currently married fecund women with four living children, the difference between urban and rural women, between educated and uneducated women, and between women whose husbands hold high and low level jobs is in most cases less than 10 percentage points. These results appear to support the conclusion that these women's desire for no more children may be less influenced by socioeconomic development than by practical recognition of the burdens of supporting a large family "under difficult circumstances" (86).

Table 8. Marital Formation

	Percentage of women 20-24 still single	Mean age at first marriage[a]
ASIA & PACIFIC		
Bangladesh	5	12.5[b]
Fiji	35	18.1
Indonesia	20	15.8
Korea, Rep. of	55	19.9
Malaysia	50	18.1
Nepal	6	15.5
Pakistan	22	16.9
Sri Lanka	61	18.7
Thailand	41	19.2
LATIN AMERICA		
Colombia	44	18.9
Costa Rica	45	19.5
Dominican Republic	29	17.8
Mexico	38	18.4
Panama	35	18.7
Peru	48	18.9

Note: Many first country reports show mean age in completed years, while here it is shown in exact years.

[a] Restricted to women of 25 years or over who first married (legally or in common law) before the age of 25, except Bangladesh

[b] Bangladesh only: restricted to women of 20 or over who first married before the age of 20

Source: First Country Reports. For Column 1: Bangladesh, Table II.4; Fiji, 17; Indonesia, 0.1.3A; Korea, II.3; Malaysia, (data from separate tabulation); Nepal, 4.1; Pakistan, 3.2; Sri Lanka, II.4; Thailand, 0.1.3; Colombia, 1.1.1; Costa Rica, 19; Dominican Republic, 27; Mexico, II.3; Panama, 33; Peru, 0.2.1. From Column 2: Table 1.1.3A, except Bangladesh, Indonesia, Nepal, 1.1.3; Fiji, D3; Pakistan, 3.6.

While nowhere in the developing world is the two-child family yet considered the norm, there are indications that large numbers of women in some countries are coming to view this family size as their target. In Bangladesh, South Korea, Sri Lanka, Thailand, Colombia, and Peru, half or more of the women with two children — a son and a daughter — state that they want no more (see Table 7). In another five countries over 30 percent of such women want no more children. The real exceptions to this pattern are Malaysia and Nepal, where over three-quarters of women with two children either want more or express no preference.

The preference for sons over daughters still very much characterizes a large part of Asia. In Bangladesh, South Korea, and Nepal, over 95 percent of women with one living son and one living daughter who want another child and state a sex preference would prefer the next to be a boy (see Table 7). The only exception in the Asian countries analyzed is Indonesia, where roughly half of the women do not care one way or the other. In Latin America, the more traditional societies of Mexico and Peru prefer boys, but not to the same extent as in most of Asia. In Panama there is some degree of preference for daughters.

Age at Marriage

Mean age at marriage is a useful gauge for comparing marriage patterns across societies or across groups within a given society. In WFS reports this mean is calculated for women aged 25 or more who married before age 25. The results show that women in most areas of Asia and the Middle East marry earlier than women in Latin America and that women with secondary education marry, on average, about two years later than women with only primary school education. (See Table 8.)

A comparison of the cohorts, or age groups, of women now age 25 to 29 and 40 to 44 shows that in many countries the

Table 9. Mean Age at First Marriage

	Women aged 25-29[a]	Women aged 40-44[a]
ASIA & PACIFIC		
Bangladesh[b]	12.8	12.1
Fiji	18.8	17.6[c]
Indonesia	16.2	15.6
Korea, Rep. of	21.6	18.6
Malaysia	19.3	17.6
Nepal	15.4	15.6
Pakistan	17.5	16.2
Sri Lanka	19.4	18.2
Thailand	19.2	18.9
LATIN AMERICA		
Colombia	18.8	19.0
Costa Rica	19.6	19.4
Dominican Republic	17.6	17.6
Mexico	18.6	18.2
Panama	19.1	18.4
Peru	18.9	19.0

[a] Restricted to women who first married (legally or in common law) before age 25, except Bangladesh

[b] Bangladesh only: restricted to women who married before age 20

[c] Age 40 and older

Source: First Country Reports. Table 1.1.3A, except Bangladesh, Indonesia, Nepal, 1.1.3; Fiji, D3; Pakistan, 3.6.

mean age at which women first marry, whether legally or consensually, is rising. This is especially true for societies characterized by early entrance into matrimony, like Bangladesh, with a mean age of 12.5 years. It is also true in those Asian societies where women tend to marry late, such as South Korea and Sri Lanka, with mean ages of 19.9 and 18.7 years, respectively (see Table 8). The most dramatic change has occurred in Korea, where age at marriage for those marrying before age 25 has risen from 18.6 to 21.6 years, with smaller changes taking place in many of the other Asian countries (see Table 9). In most of the Latin American countries, with the sole exception of Panama, the age of marriage has changed very little.

Overall, mean age at marriage is not a sensitive indicator of recent secular trends, since the analysis is restricted to women over the age of 25 who first married before the age of 25. For even the youngest age group in such an analysis, those currently 25 to 29, the data refer to an event which happened, on average, 8 or 9 years before the survey; for those now aged 45 to 49, to an event occurring almost 30 years prior to the survey. Memory, especially among illiterate people, may be faulty. Even if recollection is accurate, such analyses will not give a true picture of very recent changes, as is the case with age at marriage in Bangladesh, for example. Although nearly 80 percent of the married Bangladesh women in their late 20s who were surveyed had been married by age 15, among the women aged 15 at the time of the household survey only 47 percent were married (2). To study recent trends, attention should be directed to complete birth cohorts (age groups) of women, both married and single. Trends are detected by examining, for successive cohorts, the proportion who first married prior to a given age, for example, 15, 20, or 25.

Nevertheless, recent and rapid changes in age at first marriage are detectable from WFS data in a number of countries. Two examples will suffice. In Sri Lanka and Malaysia, where age at first marriage has averaged less than 19 years, currently the percentage of women 20 to 24 who have ever entered into a marital union is only 39 percent and 50 percent, respectively. Quite obviously, by the time this cohort reaches the age of 50 their mean age at first marriage will be several years higher than the current mean of under 19 years (see Table 8).

Marital Stability

The degree of stability of marital unions varies considerably across countries, but the total amount of time that women spend in marital unions is much more uniform. Figures on the percentage of ever-married women who have been married more than once vary from a low of 4 percent for South Korea, Pakistan, and Sri Lanka to a high of 32 percent for Indonesia and the Dominican Republic (see Table 10). But where separation and divorce are most common, remarriage is also the rule. Hence the proportion of elapsed time since date of first marriage spent in marital union varies much less across countries, and across social groups within countries, than do the figures on the number of times married.

In the countries in which only 4 percent of the women have been married more than once, women have, on the average, spent 97 percent of the elapsed time since first marriage in marital union. For the three countries where separation and remarriage are most common (Indonesia, the Dominican Republic, and Panama), women have spent 88 percent of the elapsed time in marital union. Since the elapsed time spent in marital union is a measure of the exposure of women to the risk of childbearing, and inasmuch as it generally varies by less than 10 percent across groups within societies and across societies themselves, it is not surprising that fertility bears little relationship to marital stability.

Table 10. Marital Stability

	Percentage of ever-married women who have been married more than once	Proportion of elapsed time since date of first marriage spent in marital union
ASIA & PACIFIC		
Bangladesh	13	93
Fiji	8	96
Indonesia	32	91
Korea, Rep. of	4	NA
Malaysia	13	91
Nepal	NA	96
Pakistan	4	98
Sri Lanka	4	95
Thailand	12	89
LATIN AMERICA		
Colombia	14	91
Costa Rica	9	93
Dominican Republic	32	84
Mexico	8	93
Panama	25	89
Peru	11	93

NA = not available

Source: First Country Reports. For Column 1: Table 1.3.1, except Fiji, D5; Indonesia: 4.1.1; Thailand, 3.1.1. For Column 2: Table 3.1.4, except Fiji, G30;

Early Marital Fertility

There are interesting variations in the timing of fertility with respect to the date of marriage, both among countries within regions and among regions (see Table 11). The percentage of

Table 11. Early Marital Fertility

	Percentage of first births occurring before, or within first 7 months of, mother's first marital union[a]	Mean number of children born before, or in the 5 years following, date of first marital union
ASIA & PACIFIC		
Bangladesh	NA	1.0
Fiji	[b]	1.9
Indonesia	9	1.2
Korea, Rep. of	6	1.6
Malaysia	11	1.9
Nepal	NA	0.9
Pakistan	NA	1.5
Sri Lanka	7	1.9
Thailand	12	1.7
LATIN AMERICA		
Colombia	20	2.3
Costa Rica	26[c]	2.4
Dominican Republic	6	2.2
Mexico	13	2.1
Panama	18	2.0
Peru	28	2.2

NA = Information not available, but figures assumed to be 0

[a] Based on women first married at least 5 years ago

[b] Before marriage: 5.1; within 11 months of marriage: 7.8.

[c] Base excludes women who had no children before 5 years of marriage.

Source: First Country Reports. For Column 1: Table 2.1.1, except Fiji, E9; Indonesia, 3.5.1. For Column 2: Table 2.1.2A, except Fiji, E10; Indonesia, 3.5.2; Pakistan, 2.1.2; Panama, 2.1.2B.

Table 12. Age at Marriage and Early Fertility in Countries of Asia and Latin America

	No. of countries	Mean age at marriage	Premarital conceptions of first births (%)	Mean no. of births in first five years
ASIA				
Early marriage	4	15.2	3	1.2
Late marriage	5	18.7	9	1.8
LATIN AMERICA				
Early marriage	3	18.3	13	2.1
Late marriage	3	19.1	25	2.3

premarital conceptions among first births varies from presumably zero in Bangladesh, Nepal, and Pakistan to well over 20 percent in some Latin American countries. In the same way, the mean number of children born by women either before or within the five years following the date of first marriage varies from 0.9 for Nepal to 2.4 for Costa Rica. The average for the nine Asian countries is 1.5, and for the six Latin American countries is 2.2.

In interpreting the figures in Table 11 it is useful to refer back to Table 8. Dividing the Asian and Latin American regions each into two groups based on age at marriage, it becomes clear that early marital fertility is associated with an older age at marriage (see Table 12). In the Latin American countries characterized by late marriage, at an average of 19.1 years, women have an average of 2.3 births in the first five years, whereas in the early-marrying Asian countries with a mean age at marriage of 15.2, women have an average of 1.2 births in the first five years. Thus, although an increase in age at marriage would be expected to lower completed fertility by reducing the number of years that women are exposed to the risk of childbearing, this is partly compensated for by a tendency of late marrying women to have more children in the first few years of marriage.

Table 13. Contraceptive Knowledge and Use

	Percentage of ever-married women who have heard of a contraceptive method[a]	Percentage of ever-married women who have used a contraceptive method
ASIA & PACIFIC		
Bangladesh	82	14
Fiji	100[b]	68
Indonesia	77	34
Korea, Rep. of	97	57
Malaysia	92	46
Nepal	22	4
Pakistan	75	10
Sri Lanka	91	43
Thailand	96	45
LATIN AMERICA		
Colombia	96	59
Costa Rica	100[c]	82
Dominican Republic	97	47
Mexico	90	45
Panama	98	73
Peru	82	49

[a] Prompted question except in Pakistan, where only spontaneous responses were used.

[b] The precise figure is 99.9 percent.

[c] The precise figure is 99.6 percent.

Source: First Country Reports. For Column 1: Table 4.2.2A, except Bangladesh, 4.2.2; Colombia, Dominican Republic, Pakistan, 4.2.1A; Costa Rica, 4.2.1B; Fiji, H1; Indonesia, 2.1.1C. For Column 2: Table 4.3.1, except Bangladesh, Colombia, Korea, Nepal, 4.3.1A; Costa Rica, 4.3.1B; Dominican Republic, 4.3.1B; Fiji, H3; Indonesia, 2.4.1C.

Knowledge, Availability, and Use of Contraceptives

In all but one of the 15 countries surveyed, three-quarters or more of ever-married women have heard of at least one contraceptive method, and in 10 of them this figure is 90 percent or higher (see Table 13). Only in Nepal, where a mere 22 percent have heard of a method, has the message not come across. In all but three countries, the best known method is the pill, followed by sterilization and the IUD. Traditional methods such as withdrawal and abstinence are cited by less than half of the women in most countries. The near universality of knowledge concerning contraception is a tribute to the efforts of concerned people working in family planning programs around the world. (See Table 14.)

There is much more intercountry variability when it comes to the percentage of ever-married or currently married women who have actually used a contraceptive at some time (see Tables 13, 15, and 16). The figure for ever-married women varies from a low of 4 percent in Nepal to a high of 82 percent in Costa Rica. The most startling contrasts between knowledge and use occur in Bangladesh and Pakistan. In both countries 70 percent or more of currently married fecund women say that they have heard of contraception, but only 15 percent and 10 percent, respectively, report ever having used a method (see Tables 14 and 16).

On the whole, countries with strong family planning programs show the highest levels of knowledge about and practice of family planning. WFS data can be useful in pointing to important weaknesses in national family planning programs. For example, as one analysis observes,

> Pakistan succeeded in educating a substantial majority of women about family planning but did not succeed in effectively delivering services and supplies. Only 32 percent of the Pakistan respondents knew where to get family planning and only 29 percent had been visited by or had met a family planning worker, even though most of the country was supposedly covered by male-female teams who were to contact every couple in their area four times per year. To date the Nepal program has had only modest success in educating the public about family planning and very little success in providing services and supplies. Only 22 percent of the respondents knew any method of contraception and only 6 percent knew where to get contraceptives (86).

Figures on the current use of contraception by women exposed to the risk of pregnancy show the same pattern of variation among countries as do the figures on ever-use (see Table 17). Costa Rica and Panama exhibit the highest current use rates (78 percent and 65 percent, respectively), while in Nepal, Pakistan, and Bangladesh, 10 percent or fewer of exposed women are currently using a method. In general, the figures for Latin America are higher than for Asian countries.

The picture changes somewhat when attention is directed to the current use of "modern," or effective, methods. (Modern methods include sterilization, pill, injection, IUD, condom, and such female methods as the diaphragm, jellies, and creams.) On the average, across all countries, three-quarters of current users are using a modern method. But in Peru and Sri Lanka, with identical figures on current use (41 percent), only 15 percent and 24 percent, respectively, of exposed women are using a modern method. By contrast, Indonesia, Thailand, the Dominican Republic, and Mexico, with about the same

Table 14. Percentage of Currently Married Fecund Women Who Have Heard of Specific Contraceptive Methods

	No method heard of	Any method	Ineffective only[a]	Effective[b]	Sterilization		Pill	IUD	Injection	Condom	Female local	Douche	Withdrawal	Rhythm	Abstinence	Other
					Female	Male										
ASIA & PACIFIC																
Bangladesh	17	83	2	81	54	53	66	41	0	22	10	32	16	29	12	5
Fiji	0	100	0	100	96	41	99	97	50	85	—41—		56	58	57	5
Indonesia	18	82	1	81	13	9	76	55	20	46	5	4	9	14	14	NA
Korea, Rep. of	1	99	0	99	68	87	96	93	6	80	24	29	40	64	27	3
Malaysia	7	94	2	92	—75—		90[c]	43	[c]	56	—28—		32	41	32	23
Nepal	78	23	1	21	13	16	12	6	NA	5	NA	NA	NA	NA	5	1
Pakistan	29	71	0	71	6	2	64	48	NA	15	7	NA	2	0	0	0
Sri Lanka	7	93	0	93	85	41	83	65	45	55	12	9	22	47	33	3
Thailand	3	97	0	97	88	72	93	88	74	51	24	—57—				0
LATIN AMERICA																
Colombia	4	96	1	95	73	40	91	83	72	61	57	40	48	58	28	8
Costa Rica	0	100	0	100	94	68	98	93	89	92	72	60	68	82	31	7
Dominican Republic	3	97	0	97	94	30	92[d]	77	[d]	71	—70—		57	42	NA	6
Mexico[e]	10	90	0	90	63	40	84	76	71	43	44	38	49	50	NA	5
Panama	1	99	0	99	94	64	96	89	NA	76	56	62	61	66	35	0
Peru	17	83	4	79	61	19	64	44	63	40	32	48	41	56	24	11

NA = not available

[a] Ineffective methods include douche, rhythm, withdrawal, abstinence, and "other."

[b] Effective methods include pill, IUD, injection, male and female sterilizations, female local, and condom.

[c] Malaysia — Injection included with pill

[d] Dominican Republic — Injection included with pill

[e] Mexico — 21 percent of women have also heard of diaphragm.

Source: First Country Reports. Table 4.2.1B, except Costa Rica, 4.2.1C; Fiji, H2; Indonesia, 2.1.1B.

Table 15. Percentage of Ever-Married Women Who Have Ever Used Specific Contraceptive Methods[a]

	No method ever used	Any method	Ineffective only	Effective	Sterilization		Pill	IUD	Injection	Condom	Female local	Douche	Withdrawal	Rhythm	Abstinence	Other
					Female	Male										
ASIA & PACIFIC																
Bangladesh	86	14	4	10	0	0	5	1	0	5	1	2	3	5	2	1
Fiji[b]	32	68	11	57	—15—		31	16	1	16	—4—		15	16	10	1
Indonesia	66	34	4	30	0	0	23	7	1	5	0	0	2	3	4	NA
Korea, Rep. of	43	57	5	52	2	3	33	25	1	22	3	4	12	16	2	1
Malaysia	54	46	11	35	3	0	32[c]	2	[c]	9	—2—		8	10	4	6
Nepal	96	4	1	3	0	1	2	0	0	1	0	0	0	0	0	1
Sri Lanka	57	43	19	25	—9—		8	8	1	5	0	2	6	22	12	0
Thailand	55	45	6	40	6	2	26	9	5	4	1	—15—				0
LATIN AMERICA																
Colombia	41	59	12	47	4	0	33	15	3	8	12	5	17	18	5	3
Costa Rica	18	82	9	73	12	1	51	12	9	36	11	5	20	25	4	2
Dominican Republic	53	47	15	32	11	0	20[d]	7	[d]	11	—9—		19	7	NA	1[d]
Mexico[e]	55	45	10	35	3	0	26	8	7	7	7	5	18	13	NA	1
Panama	27	73	10	62	21	0	42	8	NA	13	9	10	18	16	8	0
Peru	52	49	26	23	3	0	13	3	5	7	5	15	17	27	7	3

NA = not available

[a] This table was run also for currently married fecund women in the following countries: Bangladesh, Indonesia, Rep. of Korea, Nepal, Mexico, and Peru. See Table 16.

[b] Fiji — Breast-feeding specified as method in Questionnaire; 6.8 percent of women had used this method.

[c] Malaysia — Injection included with pill

[d] Dominican Republic — Injection included with pill

[e] Mexico — 0.7 percent of women have also used diaphragm.

Source: First Country Reports. Table 4.3.1A, except Fiji, H3; Indonesia, 2.4.1A; Malaysia, Sri Lanka, Thailand, Dominican Republic, Panama, 4.3.1.

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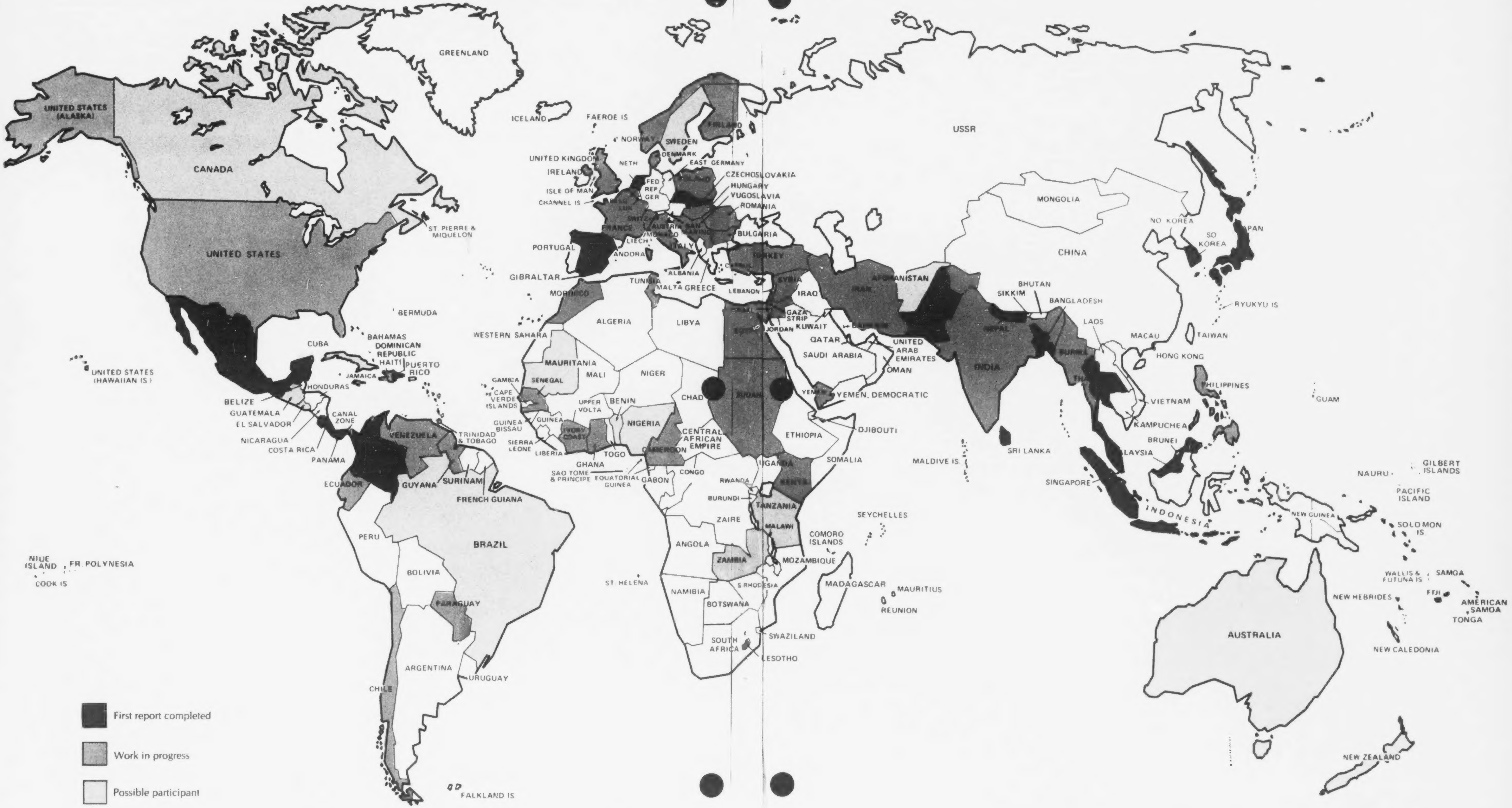
Countries Participating in the World Fertility Survey as of April 1979, by Progress Status


GREENLAND
UNITED STATES (ALASKA)
CANADA
UNITED STATES
ICELAND
FAEROE IS
NORWAY
SWEDEN
FINLAND
DENMARK
UNITED KINGDOM
IRELAND
NETH
EAST GERMANY
FED REP GER
ISLE OF MAN
CHANNEL IS
BELG
LUX
FRANCE
SWITZ
AUSTRIA
SAN MARINO
MONACO
LIECH
ITALY
POLAND
CZECHOSLOVAKIA
HUNGARY
YUGOSLAVIA
ROMANIA
BULGARIA
ANDORRA
PORTUGAL
SPAIN
ALBANIA
GREECE
MALTA
TURKEY
CYPRUS
SYRIA
LEBANON
ISRAEL
GIBRALTAR
TUNISIA
MOROCCO
ALGERIA
LIBYA
EGYPT
ST. PIERRE & MIQUELON
BERMUDA
BAHAMAS
DOMINICAN REPUBLIC
HAITI
PUERTO RICO
CUBA
JAMAICA
MEXICO
UNITED STATES (HAWAIIAN IS)
BELIZE
GUATEMALA
EL SALVADOR
HONDURAS
NICARAGUA
COSTA RICA
PANAMA
CANAL ZONE
TRINIDAD & TOBAGO
VENEZUELA
COLOMBIA
GUYANA
SURINAM
FRENCH GUIANA
ECUADOR
PERU
BRAZIL
BOLIVIA
PARAGUAY
CHILE
ARGENTINA
URUGUAY
FALKLAND IS
NIUE ISLAND
FR. POLYNESIA
COOK IS
WESTERN SAHARA
MAURITANIA
SENEGAL
GAMBIA
CAPE VERDE ISLANDS
GUINEA BISSAU
GUINEA
SIERRA LEONE
LIBERIA
IVORY COAST
GHANA
TOGO
BENIN
UPPER VOLTA
MALI
NIGER
NIGERIA
CAMEROON
CHAD
SAO TOME & PRINCIPE
EQUATORIAL GUINEA
GABON
CONGO
CENTRAL AFRICAN EMPIRE
SUDAN
ETHIOPIA
DJIBOUTI
SOMALIA
UGANDA
KENYA
RWANDA
BURUNDI
ZAIRE
TANZANIA
MALAWI
ZAMBIA
ANGOLA
MOZAMBIQUE
S. RHODESIA
NAMIBIA
BOTSWANA
SOUTH AFRICA
SWAZILAND
LESOTHO
ST. HELENA
MADAGASCAR
MAURITIUS
REUNION
COMORO ISLANDS
SEYCHELLES
GAZA STRIP
JORDAN
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QATAR
BAHRAIN
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Table 16. Percentage of Currently Married Fecund Women Who Have Ever Used Specific Contraceptive Methods

	No method ever used	Any method	Ineffective only	Effective	Sterilization Female	Sterilization Male	Pill	IUD	Injection	Condom	Female local	Douche	Withdrawal	Rhythm	Abstinence	Other
ASIA & PACIFIC																
Bangladesh	85	15	4	11	0	1	6	1	0	5	1	2	3	5	3	1
Indonesia	56	44	4	39	0	0	30	9	1	6	0	1	3	4	4	7
Korea, Rep. of	37	63	5	58	2	4	38	27	1	25	3	4	14	19	3	1
Nepal	96	5	1	4	0	2	2	0	0	1	0	0	0	0	0	1
Pakistan[a]	90	10	2	8	—1—		4	4	NA	3	1	NA	0	0	2	1
LATIN AMERICA																
Mexico[b]	50	51	10	40	3	0	29	10	8	7	8	4	14	20	NA	1
Peru	48	52	27	25	3	0	15	3	5	7	5	16	18	29	8	3

NA = not available

Note: Data not available for Fiji, Malaysia, Sri Lanka, Thailand, Colombia, Costa Rica, the Dominican Republic, and Panama. See Table 15 for data on ever-married women in these and other countries.

[a] Base is all currently married women, including those not fecund.
[b] Mexico — 0.7 percent of women have also used diaphragm.

Source: First Country Reports. Table 4.3.1B, except Indonesia, 2.4.1B; Pakistan, 4.3.1.

level of overall use as Peru and Sri Lanka, show more than 30 percent of exposed women using a modern method (see Tables 17 and 18).

One of the most striking findings in the area of contraceptive use is the high incidence of male or female sterilization for contraceptive purposes. As Table 17 shows, the proportion of currently married, fecund, nonpregnant women (exposed women) sterilized for contraceptive purposes — or with the husband sterilized — is 11 percent in Thailand, about 15 percent in Sri Lanka, the Dominican Republic, and Costa Rica, 22 percent in Fiji, and 26 percent in Panama. Indeed, contraceptive sterilization has displaced the pill as the most popular modern method of contraception in four of these six countries and is the second most used modern method, after the pill, in Malaysia, Thailand, and Costa Rica. Nepal is an interesting case. There are very few users but practically all of them rely on contraceptive sterilization. (See also Table 19.)

Unmet Need

An important application of WFS data is to determine the extent of unmet need for family planning services. The concept of

Table 17. Percent Distribution of Exposed[a] Women According to Current Use of Specific Contraceptive Methods

	No method used	Any method	Sterilization Female	Sterilization Male	Pill	IUD	Injection	Condom	Female local	Douche	Withdrawal	Rhythm	Abstinence	Other
ASIA & PACIFIC														
Bangladesh	90	10	0	1	3	1	NA	1	0	0	1	1	1	0
Fiji	44	56	—22—		11	6	NA	8	NA	NA	3	3	NA	2
Indonesia	63	37	0	0	21	8	0	3	0	0	1	1	1	2
Korea, Rep. of	54	46	2	4	11	10	0	7	0	0	3	6	1	0
Malaysia	58	43	4	1	21[b]	1	[b]	4	—0—		3	5	2	3
Nepal	97	3	0	2	1	0	0	0	0	0	0	0	0	0
Pakistan	93	7	1	0	1	1	NA	1	0	NA	0	0	2	0
Sri Lanka	59	41	—13—		2	6	0	3	0	0	2	10	5	0
Thailand	55	46	8	3	19	8	3	1	0	————3————				1[c]
LATIN AMERICA														
Colombia	48	52	5	0	16	10	1	2	3	1	6	6	1	1
Costa Rica	22	78	15	1	27	6	2	11	2	0	6	6	1	1
Dominican Republic	59	41	16	0	11[d]	4	[d]	2	—3—		5	2	NA	0
Mexico	59	42	4	0	15	8	2	1	2	0	5	4	NA	0
Panama	35	65	26	0	21	5	1	2	2	1	4	3	2	0
Peru	59	41	4	0	6	2	1	1	1	4	4	14	3	1

NA = not available

[a] All currently married, nonpregnant, and fecund women, including those sterilized for contraceptive purposes
[b] Malaysia — Injection included with pill
[c] Thailand — Folk methods included with "other"
[d] Dominican Republic — Injection included with pill

Source: First Country Reports. Table 4.4.1, except Malaysia, Dominican Republic, also 5.3.2; Pakistan, also 5.3.2 revised; Thailand, also 5.2.1; Fiji, H7; Indonesia, 2.3.2.

unmet need can be confusing because it takes account both of intention and of practice and because it can be defined and measured in different ways (85, 100). Basically, the term "unmet need" refers to women with three identifiable characteristics:

1. They are currently married, nonpregnant, and fecund, usually described by the comprehensive term "exposed,"
2. they want no more children, and
3. they are not using (modern) means of contraception.

As Table 18 shows, unmet need can be measured numerically as a percentage of all currently married women; it can be measured as a percentage of all exposed women; or it can be measured as a percentage of all exposed women who want no more children. All of these measures understate the total unmet need for family planning because they do not include those who want to space or postpone births, only those who want no more births at all. An initial analysis of unmet need in five Asian countries was prepared by Charles F. Westoff in 1978 (100) and is expanded in Table 18 to include all 15 countries for which WFS data are now available.

The most conservative definition and measurement uses a base, or denominator, of all currently married women and a numerator of women who are exposed *and* want no more children *and* are not using an efficient modern method. As Table 18 shows, unmet need calculated in this manner (Column 5) runs from a high of 47 percent in Bangladesh and over 30 percent in Korea, Sri Lanka, and Peru to a low of 12 percent in Costa Rica and Fiji.

It should be noted that while the highest need may be in Bangladesh and Peru, where about 60 percent of the women want no more children but only 6 percent and 15 percent, respectively, are using a modern method, unmet need is also high in South Korea, where 74 percent want no more children

Table 18. Percentage of Exposed* Women Who Want No More Children, Percentage Not Currently Using Contraception, and Estimates of Unmet Need for Effective Contraception in 15 Developing Countries

	(1)	(2)		(3)		(4)		(5)	
	Of exposed women, % who want no more children	Of exposed women, % not using		Of exposed women who want no more, % not using		Of all exposed women, % who want no more *and* are not using		Of all currently married women, % who are exposed *and* want no more *and* are not using	
		any method	modern method	any method	modern method	any method	modern method	any method	modern method
ASIA & PACIFIC									
Bangladesh**	(N = 4643)	(N = 4643)		(N = 2974)		(N = 4643)		(N = 5767)	
	64	**90**	**94**	**86**	**91**	**55**	**60**	**45**	**47**
Fiji†	(N = 3314)	(N = 3314)		(N = 1695)		(N = 3314)		(N = 4650)	
	51	**43**	**51**	**26**	**34**	**13**	**17**	**10**	**12**
Indonesia	(N = 5628)	(N = 5628)		(N = 2229)		(N = 5628)		(N = 7868)	
	40	**63**	**68**	**47**	**54**	**19**	**21**	**13**	**15**
Korea, Rep. of	(N = 3851)	(N = 3851)		(N = 2856)		(N = 3851)		(N = 5051)	
	74	**54**	**65**	**44**	**56**	**33**	**42**	**25**	**32**
Malaysia	(N = 4482)	(N = 4482)		(N = 2071)		(N = 4482)		(N = 5802)	
	46	**58**	**69**	**47**	**62**	**22**	**29**	**17**	**22**
Nepal	(N = 4325)	(N = 4325)		(N = 1283)		(N = 4325)		(N = 5501)	
	30	**97**	**97**	**91**	**92**	**27**	**27**	**21**	**21**
Pakistan	(N = 3335)	(N = 3335)		(N = 1413)		(N = 3335)		(N = 4663)	
	42	**93**	**95**	**85**	**90**	**36**	**38**	**26**	**27**
Sri Lanka	(N = 4706)	(N = 4706)		(N = 2926)		(N = 4706)		(N = 6163)	
	62	**59**	**76**	**47**	**66**	**29**	**41**	**22**	**31**
Thailand	(N = 2529)	(N = 2529)		(N = 1553)		(N = 2529)		(N = 3482)	
	61	**55**	**58**	**44**	**48**	**27**	**30**	**20**	**22**
LATIN AMERICA									
Colombia	(N = 2323)	(N = 2323)		(N = 1423)		(N = 2323)		(N = 2827)	
	61	**48**	**63**	**44**	**60**	**27**	**37**	**22**	**30**
Costa Rica	(N = 2222)	(N = 2222)		(N = 1158)		(N = 2222)		(N = 2684)	
	52	**22**	**35**	**16**	**29**	**8**	**15**	**7**	**12**
Dominican Republic	(N = 1378)	(N = 1378)		(N = 717)		(N = 1378)		(N = 1808)	
	52	**59**	**70**	**43**	**57**	**23**	**30**	**17**	**23**
Mexico	(N = 4107)	(N = 4107)		(N = 2292)		(N = 4107)		(N = 5640)	
	56	**59**	**68**	**52**	**63**	**29**	**35**	**21**	**26**
Panama	(N = 2257)	(N = 2257)		(N = 1413)		(N = 2257)		(N = 2723)	
	63	**35**	**46**	**26**	**37**	**16**	**23**	**14**	**19**
Peru	N = 3851)	(N = 3851)		(N = 2307)		(N = 3851)		(N = 5061)	
	61	**59**	**85**	**54**	**83**	**33**	**51**	**25**	**38**

*All currently married, nonpregnant, and fecund women, including those sterilized for contraceptive purposes.
**Bangladesh only — Some women were asked: "Do you want another child soon?"
†Fiji only — excludes women in postpartum abstinence

Source: First Country Reports. Bangladesh: Table 5.2.1; Fiji: I13; Indonesia: 4.5.4; Rep. of Korea: 5.2.1; Malaysia: 5.2.3. (figures adjusted to include those sterilized for contraceptive purposes); Nepal: 5.2.3; Pakistan: 5.3.2. (adjusted, see Malaysia); Sri Lanka: 5.2.3; Thailand: 5.2.1 (adjusted, see Malaysia); Colombia: 5.2.3.; Costa Rica: 5.2.3B; Dominican Rep.: 5.2.3 (adjusted, see Malaysia); Mexico: 5.2.1; Panama: 5.2.3; Peru: 5.2.1.

but only 35 percent are using a modern method. Unmet need is lowest in countries with either high fertility ideals, such as Indonesia (15 percent) and Nepal (21 percent), or those characterized by extensive use of modern contraceptives, such as Costa Rica (12 percent) and Panama (19 percent). Across the remaining countries the unmet need for modern family planning to terminate childbearing runs at about the level of 30 percent of currently married women (see Table 18).

Measured in a different way, as a percentage of all exposed women who want no more children (see Column 3, Table 18), the percentage not using modern methods of family planning is considerably higher — in fact, on the average more than twice as high. In Nepal, Bangladesh, and Pakistan, for example, the percentage of exposed women wanting no more children who are not using modern means of family planning is close to 90 percent. In most of the other countries, it is well above 50 percent.

To close this gap between the desire for no more children and the use of modern methods, better knowledge of family planning service outlets and easier access to them are needed, according to an analysis by Germán Rodríguez of the WFS staff (94). In Malaysia, Nepal, and Colombia, the percentage of women not using effective contraceptives among exposed

Figure 4. The World Fertility Survey builds a national capacity for conducting population surveys by training personnel such as these supervisors in Nepal. (Photo courtesy of V.C. Chidambaram)

WORLD FERTILITY SURVEY CONFERENCE, 1980

The International Statistical Institute/World Fertility Survey is organizing a World Conference to be held at the Wembley Conference Centre in London from July 7 to 11, 1980.

The objects of the Conference will be:

1. To give a public account of the substantive findings of the World Fertility Survey to date
2. To give ministers and senior officials concerned with population policies an opportunity to become familiar with the significance of the findings of the Survey
3. To encourage use of the data available and to stimulate further analysis at the country level as well as on a comparative basis
4. To consider the future of inquiries like the WFS.

A Program Committee under the chairmanship of Dr. Mercedes Concepcion and an Organizing Committee under the chairmanship of Sir Maurice Kendall have been established.

The Conference will last five days. About half of the time will be spent in plenary session discussing general policy-related matters; the remainder of the program will consist of simultaneous discussions of methods and substantive results. For each session there will be an organizer and (in most cases) two discussants.

Many at the Conference will be attending at the invitation of ISI/WFS. These invitees will include people concerned with relevant policy matters, representatives of WFS-associated survey organizations in participating countries, representatives from countries likely to participate, and other persons of standing in the field of demography.

There will also be places available for a limited number of other interested persons. They will be responsible for their own expenses and will be charged a registration fee of US $90. Applications can be sent in at any time; they will be acknowledged, but decisions on which can be accepted will only be made later in the year in light of the number received.

Inquiries about the Conference should be addressed to Mr. David Whitelegge, Chief, Information Section, World Fertility Survey, International Statistical Institute, 35-37 Grosvenor Gardens, London SW1W OBS, United Kingdom.

The following subjects will be covered in the various conference sessions:

Population trends and policies, with emphasis on developments since the World Population Conference at Bucharest in 1974
Contribution of WFS to an understanding of the world population situation and to population policies
Policy implications of WFS findings (family formation in developing countries, fertility and socioeconomic factors in developing countries, fertility and family planning in developing countries, factors affecting fertility in developed countries)
Nuptiality and fertility
Subpopulation fertility differentials
Sociobiological factors in exposure to child-bearing
Multifactor explanation of fertility levels
Mortality
Fertility preferences
Use of family planning services
Determinants of fertility change
Data collection procedures
Data processing
Methodology of birth history analysis
Multivariate analysis (including standardization)
Problems and costs of organizing an international survey
Assessment of WFS data
Sampling errors and sample design
Estimation of fertility trends using WFS and other sources
Country case-studies
Future of WFS

Table 19. Percent Distribution of Exposed[a] Women According to Current Use of Specific Contraceptive Method Among Women Who Do Not Desire Future Birth

	No method used	Any method	Ineffective only	Effective	Sterilization Female	Sterilization Male	Pill	IUD	Injection	Condom	Female local	Douche	Withdrawal	Rhythm	Abstinence	Other
ASIA & PACIFIC																
Bangladesh	86	14	5	9	1	1	5	1	NA	1	0	0	1	2	2	0
Fiji[b]	26	74	7	67	—43—		9	7	NA	7	NA	NA	3	3	NA	2
Indonesia	47	53	7	46	1	0	27	14	[c]	4	1[c]	—4—				3
Korea, Rep. of	44	56	12	44	3	6	13	13	0	8	0	0	4	7	1	0
Malaysia	48	53	15	38	—11—		20[d]	1	[d]	5	—0—		4	5	4	3
Nepal	91	9	0	9	0	7	1	0	0	0	0	0	0	0	0	0
Pakistan	85	15	4	11	3	0	3	2	NA	2	1	NA	0	0	3	0
Sri Lanka	47	54	20	34	20	1	2	8	1	3	0	0	2	12	6	0
Thailand	44	56	4	52	14	5	20	10	3	1	0	—4—				1
LATIN AMERICA																
Colombia	44	56	16	40	8	0	16	11	1	2	3	1	7	6	1	1
Costa Rica	16	84	13	71	29	2	20	5	4	10	2	0	5	6	1	1
Dominican Republic	43	57	14	43	30	0	9[e]	4	[e]	2	—3—		6	2	NA	0
Mexico	52	48	11	37	7	1	15	9	2	1	2	0	6	5	NA	0
Panama	26	74	10	64	41	1	16	4	1	1	2	1	4	3	2	0
Peru[f]	54	46	29	17	6	0	5	2	1	2	1	5	5	15	4	1

NA = not available

[a] All currently married, nonpregnant, and fecund women, including those sterilized for contraceptive purposes
[b] Fiji — Definition of exposed excludes those in postpartum abstinence
[c] Indonesia — Injection included with female local methods
[d] Malaysia — Injection included with pill
[e] Dominican Republic — Injection included with pill
[f] Weighted sample

Source: First Country Reports. Table 5.2.3, except Bangladesh, Rep. of Korea, Thailand, Mexico, Peru 5.2.1; Costa Rica, 5.2.3A; Fiji, I13; Indonesia, 4.5.4; Pakistan, 5.2.3 revised.

Table 20. Percent Distribution of Exposed[a] Women According to Current Use of Specific Contraceptive Methods Among Women Who Desire Future Birth

	No method used	Any method	Ineffective only	Effective	Pill	IUD	Injection	Condom	Female local	Douche	Withdrawal	Rhythm	Abstinence	Other
ASIA & PACIFIC														
Bangladesh	98	2	1	1	0	0	NA	1	0	0	1	0	0	0
Fiji[b]	62	38	8	30	14	6	NA	10	NA	NA	4	4	NA	2
Indonesia	75	26	3	22	17	4	[c]	2	0[c]	—2—				1
Korea, Rep. of	84	16	4	12	5	3	0	4	0	0	1	3	0	0
Malaysia	66	34	9	25	22[d]	1	[d]	3	—0—		2	4	1	3
Nepal	100	1	0	1	0	0	0	0	0	0	0	0	0	0
Pakistan	99	2	0	1	0	0	NA	1	0	NA	0	0	0	0
Sri Lanka	80	21	11	9	2	4	0	3	0	0	2	8	2	0
Thailand	72	28	4	24	16	6	2	1	0	—3—				1
LATIN AMERICA														
Colombia	55	45	13	33	18	10	1	2	3	1	4	6	1	1
Costa Rica	29	71	13	57	35	7	1	11	2	0	6	6	1	0
Dominican Republic	75	25	9	15	12[e]	4	[e]	2	—3—		3	1	NA	0
Mexico	66	34	8	26	15	7	2	1	2	0	3	4	NA	0
Panama	49	51	13	38	28	6	1	2	3	1	4	4	2	1
Peru[f]	64	36	24	13	7	2	2	1	1	4	4	15	1	0

NA = not available

[a] All currently married, nonpregnant, and fecund women, including those sterilized for contraceptive purposes
[b] Fiji — Base includes undecided as well as those who want more children. Definition of exposed excludes those in postpartum abstinence.
[c] Indonesia — Injection included with female local methods
[d] Malaysia — Injection included with pill
[e] Dominican Republic — Injection included with pill
[f] Weighted sample

Source: First Country Reports. Table 5.2.3, except Bangladesh, Rep. of Korea, Thailand, Mexico, Peru, 5.2.1; Costa Rica, 5.2.3A; Fiji, I13; Indonesia, 4.5.4; Pakistan, 5.2.3 revised.

women who want no more children is over 80 percent for those who know of no outlet for services compared with about 50 percent for those who know of an outlet nearby. The corresponding figures for Nepal are 95 and 51 percent, respectively (94).

The study concludes:

> To sum up, we have found the unmet need for contraception among exposed women to be higher in rural areas and among the least educated. The unmet need is substantially lower among those who know an outlet, and — except in Costa Rica — significantly lower among those who know a nearby as compared with a more distant outlet. In Colombia, Korea, and Malaysia the effect of distance may be attributed to urban-rural residence, but in Nepal, perceived accessibility has a significant net effect on the unmet need (94).

In other words, women who know of no outlet or estimate that the nearest outlet is more than one day's travel in Nepal or more than two hours' travel elsewhere are less likely to use family planning.

A further insight into family planning use is provided by looking at the practices of women who do desire more children but are using family planning to space births (see Table 20). In 11 of the 15 countries, more than 20 percent of the women who desire future births are using some form of family planning. In both Costa Rica and Panama, the figure is over 50 percent. It is lowest in Nepal, Pakistan, and Bangladesh. These percentages reflect the growing perception of family planning as a means to delay or space children, not merely to terminate all childbearing. Not surprisingly, the pill is the favorite method for spacing in all countries except Sri Lanka and Peru, where rhythm is most widely used, and Pakistan and Bangladesh, where the condom is. The IUD ranks second in Indonesia, Sri Lanka, Thailand, Colombia, the Dominican Republic, Mexico, and Panama.

Many factors, such as age, years since marriage, number of living children, rural or urban residence, educational level, and number of children desired, influence a woman's knowledge and use of modern family planning methods. These variables can be affected indirectly and over the long run by changes in the social and economic environment. In the short run, WFS data and analyses indicate, increasing knowledge and access to family planning services can contribute substantially to reducing the present gaps between knowledge and practice, between the number of women who want no more children and the number who use effective methods of family planning.

Estimated Availability of WFS Data as of April 1979

Country	Edited tape produced by country	Country Report No. 1 published*	Documented standard recode tape available*
AFRICA			
Cameroun	Sept. 1979	Nov. 1979	Dec. 1979
Ghana	Dec. 1979	April 1980	1980
Kenya	May 1979	Sept. 1979	Dec. 1979
Lesotho	July 1979	Dec. 1979	Dec. 1979
Senegal	Sept. 1979	March 1980	Dec. 1979
Sudan (north)	Nov. 1979	June 1980	1980
Tunisia	Aug. 1979	Nov. 1979	1980
ASIA & PACIFIC			
Bangladesh	Feb. 1977	Mar. 1979	July 1979
Fiji	July 1975	Dec. 1976	Dec. 1979
Indonesia	Oct. 1977	Jan. 1979	July 1979
Iran	1979	1979	1979
Korea	Feb. 1977	Feb. 1978	Oct. 1979
Malaysia	1977	May 1977	Oct. 1979
Nepal	Nov. 1976	Aug. 1977	Oct. 1979
Pakistan	March 1976	Oct. 1976	July 1979
Philippines	April 1979	Sept. 1979	Sept. 1979
Sri Lanka	June 1977	June 1978	Nov. 1978
Thailand	June 1976	1977	Dec. 1978
CARIBBEAN			
Guyana	June 1978	June 1979	July 1979
Haiti	May 1979	Sept. 1979	Sept. 1979
Jamaica	June 1978	Aug. 1979	July 1979
Trinidad & Tobago	Aug. 1979	Dec. 1979	Dec. 1979
LATIN AMERICA			
Colombia	March 1977	April 1978	Nov. 1978
Costa Rica	April 1977	Oct. 1978	July 1979
Dominican Republic	1976	Nov. 1976	Dec. 1979
Mexico	July 1978	March 1979	Sept. 1979
Panama	1977	March 1978	Oct. 1978
Paraguay	Nov. 1979	April 1980	1980
Peru	June 1978	May 1979	July 1979
Venezuela	May 1979	June 1979	Sept. 1979
MIDDLE EAST			
Egypt	June 1980	Dec. 1980	1980
Jordan	1977	July 1979	July 1979
Syria	Oct. 1979	June 1980	1980
Turkey	Sept. 1979	Feb. 1980	1980
Yemen A.R.	Aug. 1980	Feb. 1981	1981

*Dates after April 1979 are estimated dates of availability and are subject to change. Country approval, obtained through WFS, is required for the use of all tapes.

Table 2. Current and Future Participation of Developing Countries in the World Fertility Survey Program

Country (Population in millions*)	National Director/ Survey Director (SD)/ National Executive Agency(ies)	Languages used in Questionnaire	Modules	Sample size (Individual interview)	Date of Survey design visit/ Commencement of field work	Status of survey
AFRICA						
Benin (3.4)	—	—	—	—	—	Official interest expressed
Cameroun (8.0)	N. Ngae A. Nkoungourou (SD) Directorate of Statistics	English French Pidgin A & B Fulfulde Ewondo Bassa Duala Gomala Bamun Matakan Medumba Koka Dschang	Community-level, Factors Other**	12,000	June 1976 (preliminary)/January 1978	Editing and coding in progress

[illegible]ation data from 1978 World Population Data Sheet of the Population Reference Bureau

Other = Factors Other than Contraception Affecting Fertility

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Table 2 (Continued)

Ghana (10.9)	S.K. Kwafo J.Y. Owusu (SD) Central Bureau of Statistics	English Asante-Twi Dagbani Dangbe Ewe Fante Ga Kasem Hausa Nzema Akwapim-Twi	Abortion (in part), Factors Other, Family Planning (in part)	7,500	August 1977/ February 1979	Field work in progress
Ivory Coast (7.2)	J. Amissah G. Delaine (SD) La Direction de la Statistique	—	Community-level, Factors Other	6,000	January 1979/ December 1979	Preparatory stage
Kenya (14.8)	P. Singh Central Bureau of Statistics	(9)	Factors Other, Family Planning (in part)	10,000	August 1975/ August 1977	Tabulation in progress
Lesotho (1.3)	A.M. Monyake A.M. Mpiti (SD) Bureau of Statistics	Sesotho	Community-level, Factors Other, General Mortality, questions on availability of contraception	5,000	January 1976/ August 1977	Machine editing and recoding in progress
Mauritania (1.3)	A.I. Sy O. Cheikh (SD) Bureau Centrale du Recensement, Ministère du Plan	—	—	—	—	Project submitted for funding
Morocco (18.9)	A. Alaoui	Arabic	Family Planning, Fertility Regulation, General Mortality	7,000	September 1978/ —	Preparatory stage
Senegal (5.4)	L. Diop I.L. Diop (SD) Bureau National du Recensement, Direction de la Statistique	Wolof Pular Mandinka Serer	Community-level, Factors Other, General Mortality	5,000	June 1977/ June 1978	Editing and coding in progress
Sudan (17.1) (north)	O.A. El-Tay A. Modawi (SD) Department of Statistics, Ministry of Finance, Planning and National Economy	Arabic Bejawi	Abortion, Community-level, Factors Other	12,000	June 1977/ December 1978	Office editing in progress
Tunisia (6.0)	M. B'chir M. Ayad (SD) M. Baraket (SD) Office National du Planning familial et de la Population	Arabic	Abortion, Factors Other, Family Planning (in part)	5,000	May 1977/ May 1978	Machine editing and recoding in progress
ASIA & PACIFIC						
Afghanistan (17.8)	—	—	—	—	—	Definite interest expressed
Bangladesh (85)	M. Sattar Ministry of Health, Population Control and Family Planning	Bengali English	Abortion, Community-level, Factors Other, Fertility Regulation	6,394	March 1975/ December 1975	Country Report No. 1 published 1979
Burma (32.2)	U Soe Myint U Thein Han (SD) Department of Immigration and Manpower Services & Ministry of Home and Religious Affairs	Burmese	None	8,000	September 1977/ postponed	Survey suspended
Fiji (0.6)	R.L. Lodhia Bureau of Statistics	Fijian Hindi English	Some module-type questions included	4,928	July 1973/ February 1974	Survey completed. Country Report No. 1 published 1976
Hong Kong (4.5) (associate status)	Census and Statistics Department	—	—	—	—/1976	Country Report No. 1 published 1979
India (634.7)	—	—	—	—	—/—	Survey to be conducted in 7 states using WFS methodology and software

Table 2 (Continued)

Indonesia (140.2)	S. Suharto B. Sungkono (SD) Central Bureau of Statistics	Bahasa Sundanese Javanese Maduranese Balinese	Abortion, Family Planning, Fertility Regulation	10,000	June 1975/ March 1976	Country Report No. 1 published 1979. Further analysis planned.
Iran (35.5)	N. Maroufi Iran Statistical Center	Persian	Fertility Regulation, Husbands' Questionnaire	5,500	July 1976/ May 1977	Work on machine editing and recoding suspended.
Korea, Rep. of (37.1)	Jin Hyun Hwang E.H. Choe (SD) Bureau of Statistics & Korean Institute for Family Planning	Korean	Abortion, Community-level, Economic, Family Planning, Fertility Regulation, General Mortality	5,264	February 1974/ September 1974	Country Report No. 1 published 1978. Further analysis in progress.
Malaysia (13.0)	Nur Laily Aziz V.T. Palan (SD) Department of Statistics & National Family Planning Board	Official: Malay English Unofficial: Chinese Tamil	Abortion, Community-level, Economic, Family Planning, Fertility Regulation	6,316	April 1974/ August 1974	Country Report No. 1 published 1978. Further analysis in progress.
Nepal (13.4)	B.R. Pande J. Tuladhar (SD) Nepal Family Planning/ Maternal & Child Health Project in the Ministry of Health	Nepali Bhajipur Mathal	Abortion, Factors Other, Family Planning, Fertility Regulation	6,000	September 1975/ April 1976	Country Report No. 1 published 1977. Further analysis in progress.
Pakistan (76.8)	K. Siddiqui Training, Research & Evaluation Center of the Population Council of Pakistan	Urdu Pushto Punjabi Sindhi Baluchi	Abortion, Family Planning, Fertility Regulation	4,949	May 1974/ May 1975	Country Report No. 1 published 1976. Further analysis in progress.
Philippines (46.3)	T. Mijares & M. Concepcion (Co-Dirs.) National Census and Statistics Organization	English Tagalog Cebuano Ilocano Hiligaynon Bicol	Abortion, Factors Other, Family Planning, Fertility Regulation	15,000	September 1976/ February 1978	Recoding and tabulation in progress.
Sri Lanka (14.2)	W.A.A.S. Peiris D. Fernando (SD) Ministry of Plan Implementation & Department of Census and Statistics	Sinhalese Tamil English	Abortion, Family Planning, Fertility Regulation	6,566	January 1975/ August 1975	Country Report No. 1 published 1977. Further analysis in progress.
Thailand (45.1)	Anuri Wanglee National Economic and Social Development Board, National Statistical Office & Institute of Population Studies	Thai	Community-level, Economic (in husbands' survey), Fertility Regulation	3,778 (plus 3,500 husbands)	June 1974/ March 1975	Country Report No. 1 published 1977. Further analysis in progress.
CARIBBEAN						
Guyana (0.8)	P. Chase Bureau of Statistics	English (Caribbean version)	None	4,858	October 1974/ May 1975	Country Report No. 1 in press
Haiti (4.8)	J. Vilgrain D. Moise (SD) Institut Haitien de Statistics	Creole	Factors Other	4,500	March 1975/ July 1977	Machine editing in progress
Jamaica (2.1)	C. McFarlane Department of Statistics	English (Caribbean version)	Economic	5,500	October 1974/ November 1975	Country Report No. 1 to be published 1979
Martinique & Guadeloupe (0.6) (associate status)	Y. Charbit (Resident French Adviser) Institut National d'Etudes Démographiques	French Creole	None	Martinique: 1,400 Guadeloupe: 1,400	—/ Martinique: January 1976 Guadeloupe: October 1975	Country Report No. 1 being drafted
Trinidad & Tobago (1.1)	L. Pujadas L. Hewitt (SD) Central Statistical Office	English (Caribbean version)	Fertility Regulation	5,500	October 1974/ March 1977	Machine editing and recoding in progress. Country Report No. 1 to be published 1979.
LATIN AMERICA						
Bolivia (4.9)	—	—	—	—	—	Official interest has been expressed.
Brazil (115.4)	—	—	—	—	—	Country survey planned using WFS methodology and software

Table 2 (Continued)

Chile (10.8)	D.S. Chaparro O. Tacla (SD)	Spanish	Abortion, Factors Other, Fertility Regulation	5,500	October 1976/ —	Project suspended
Colombia (25.8)	G. Lopez-Escobar Corporación Centro Regional de Poblacion	Spanish	Abortion, Family Planning, Fertility Regulation	5,391	May 1975/ May 1976	Country Report No. 1 published 1978. Further analysis in progress.
Costa Rica (2.1)	R. Sanchez Bolaños V.R. de Ortega & E. Cordero (Co-Dirs.) Dirección General de Estadística y Censos	Spanish	Abortion, Family Planning, Fertility Regulation	3,935	September 1975/ July 1976	Country Report No. 1 published 1978. Further analysis in progress.
Dominican Republic (5.1)	N. Ramirez (SD) Consejo Nacional de Poblacion y Familia	Spanish	Family Planning, Fertility Regulation, General Mortality (in part)	3,200	August 1974/ April 1975	Country Report No. 1 published 1976. Further analysis in progress.
Ecuador (7.8)	G. Acosta Instituto Nacional de Estadística y Censos	Spanish Quichua	—	8,000	October 1977/ 1979	Field work planned for July-September 1979.
El Salvador (4.4)	—	—	—	—	—	Indication of interest
Guatemala (6.6)	M.C. Orellana J. Antillon de Vasquez (SD)	Spanish About 4 main Indian languages to be selected	—	5,000	October 1978/ 1980	Project submission awaited
Mexico (66.9)	C. Welty (SD) Dirección General de Estadística	Spanish	Abortion, Community-level, Family Planning, General Mortality (in part)	7,250	June 1975/ July 1976	Country Report No. 1 published 1979. Further analysis planned.
Panama (1.8)	F. Mascarin (SD) Oficina de Estudios de Poblacion	Spanish	Abortion, Family Planning, Fertility Regulation	3,702	October 1974/ December 1975	Country Report No. 1 published March 1978. Further analysis in progress.
Paraguay (2.9)	J. Diaz de Bedoya D. Vera (SD) Ministerio de Salud Public & Dirección Estadística	Spanish	Family Planning, Fertility Regulation	5,280	February 1978/ February 1979	Office coding in progress
Peru (17.1)	W. Caballero V.G. Diaz (SD) Instituto Nacional de Estadística	Spanish Ansash Quechua Ayacucho Quechua Cuzco Quechua Aymara	Community-level, Economic, Factors Other, Fertility Regulation, General Mortality (in part)	7,000	August 1976/ July 1977	Country Report No. 1 published 1979. Further analysis planned.
Venezuela (13.1)	J. Paez Celiz L.A. Escalona (SD) Dirección General de Estadística	Spanish	Family Planning, Fertility Regulation	4,500	June-July 1976/ March 1977	Tabulations and drafting of Country Report No. 1 in progress
MIDDLE EAST						
Egypt (39.6)	Gen. G. Askar M.H. El-Guindi (SD) Central Agency for Public Mobilization and Statistics	Arabic	Abortion, Community-level, Family Planning (in part), Fertility Regulation	10,000	February 1978/ September 1979	Preparatory stage
Jordan (2.9)	S. El Asad F. El-Hiyari Department of Statistics	Arabic	Abortion, Community-level, Factors Other, Fertility Regulation, General Mortality	3,868	October 1975/ June 1976	Country Report No. 1 to be published 1979
Syria (8.1)	F. El-Baustani M.N. El-Hallak (SD) Central Bureau of Statistics & Center for Population Surveys and Research	Arabic	Abortion, Community-level, Factors Other, Fertility Regulation, General Mortality	4,500	February 1977/ June 1978	Machine editing in progress
Turkey (42.2)	S. Uner Institute of Population Studies, Haceteppe University	Turkish	Abortion (in part), Economic (in part), Family Planning, Fertility Regulation (modified)	6,000	February, August 1976/ September 1978	Editing and coding in progress
Yemen A.R. (5.8)	M.F. Aggag A.S. Saif (SD) Department of Statistics, Central Planning Organization	Arabic	Community-level, Factors Other, General Mortality	5,000	August, November 1977/April 1979	Field work planned for September-December 1979.

Table 3. Current and Future Participation of Developed Countries in the World Fertility Survey Program

Country (Population in millions*)	Executive Agency	Sample Size	Status of survey
Australia (14.3)	—	10,000	Under consideration
Belgium (9.9) (Flemish part only)	Population and Family Study Center, Department of Public Health and the Family	4,900	Publication of synthetic report planned for end of 1979. Analysis in progress. Some papers published.
Bulgaria (8.8)	Scientific Research Institute of Statistics	6,000	Analysis in progress. Short report on marital fertility published September 1978. Final Report to be published 1979.
Canada (23.6)	Family Planning Division, Health and Welfare	Not defined	Canadian National Fertility Survey consortium has prepared a detailed project plan. Survey postponed.
Czechoslovakia (15.2)	Federal Statistical Office	3,000	Tabulation completed
Denmark (5.1)	Danish National Institute of Social Research	6,000	Analysis in progress. Publication expected 1979.
Finland (4.8)	Population Research Institute	6,100	Tabulation in progress, expected end of 1979
France (53.4)	Institut National d'Etudes Démographiques & Institut National de la Statistique et des Etudes Economiques	3,600 women 600 men	Data processing in progress
Hungary (10.7)	Hungarian Central Statistical Office	4,800	Report published 1979
Israel (3.7)	The Hebrew University	6,000	Analysis in progress. Report No. 1 to be published 1979.
Italy (56.7)	Statistical Institute	7,000	Funding approved. Field work began 1979.
Japan (114.4)	Department of Statistics and Information, Ministry of Health and Welfare	2,344	Report available in Japanese, summary in English
Netherlands (13.9) (10 marriage cohorts only)	Netherlands Interuniversity Demographic Institute	4,522	Report published 1979. Further analysis in progress.
New Zealand (3.2)	Management Services and Research Unit, Department of Health	2,081	Pilot study report lodged with WFS Library, London
Norway (4.1)	Central Bureau of Statistics	5,100	Tabulation in progress
Poland (35.1)	Central Statistical Office	10,000	Tabulation near completion. Report to be published 1979.
Portugal (9.7)	Central Bureau of Statistics	7,000	Survey in progress.
Rumania (21.9)	Population Commission of Rumania	10,000	Data processing in progress. Report expected end of 1979.
Spain (36.8)	Instituto Nacional de Estadística	6,500	First Report published 1978. Further analysis in progress.
Sweden (8.3)	National Central Bureau of Statistics	4-5,000	Approval awaited
Switzerland (6.2)	University of Zurich	1,800	Project in preparation
UK (56.0)	Office of Population Censuses and Surveys	6,589	Report in preparation. Data to be published 1979.
USA (218.4)	National Center for Health Statistics	10,000	Analysis in progress. Report to be published 1979.
Yugoslavia (22.0)	Federal Institute of Statistics	7,500	Tabulation and analysis in progress. Report in progress.

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2. BANGLADESH. MINISTRY OF HEALTH AND POPULATION CONTROL. POPULATION CONTROL AND FAMILY PLANNING DIVISION. Bangladesh fertility survey, 1975-1976. First report. [Dacca], Bangladesh, December 1978. (World Fertility Survey) 621 p. [Available, in English, from the Ministry of Health and Population Control, Dacca, Bangladesh]

3. CHULALONGKORN UNIVERSITY. INSTITUTE OF POPULATION STUDIES. and NATIONAL STATISTICAL OFFICE. POPULATION SURVEY DIVISION. The survey of fertility in Thailand. Country report. Vol. 1. Bangkok, Thailand, Chulalongkorn University and National Statistical Office, 1977. (World Fertility Survey) (Survey of Fertility in Thailand, Report 1) 188 p. [Available, in English, from the Institute of Population Studies, Chulalongkorn University, Bangkok 5, Thailand, free of charge]

4. CHULALONGKORN UNIVERSITY. INSTITUTE OF POPULATION STUDIES. and NATIONAL STATISTICAL OFFICE. POPULATION SURVEY DIVISION. The survey of fertility in Thailand. Country report. Vol. 2. Bangkok, Thailand, Chulalongkorn University and National Statistical Office, 1977. (World Fertility Survey) (Survey of Fertility in Thailand, Report 1) 524 p. [Available, in English, from the Institute of Population Studies, Chulalongkorn University, Bangkok 5, Thailand, free of charge]

5. COLOMBIA. CORPORACION CENTRO REGIONAL DE POBLACION. DEPARTAMENTO ADMINISTRATIVO NACIONAL DE ESTADISTICA [DANE]. Encuesta nacional de fecundidad, Colombia, 1976: resultados generales. [National fertility survey, Colombia, 1976. General findings] [SP] Bogotá, Colombia, DANE, September 1976. (World Fertility Survey). 491 p. [Available, in Spanish, with translation of key terms found in the tables in English and French, from the Corporación Centro Regional de Población, Carrera 6a, No. 76-34, Bogotá, D.E., Colombia, S.A., free of charge]

6. COSTA RICA. DIRECCION GENERAL DE ESTADISTICA Y CENSOS. Encuesta nacional de fecundidad, 1976, Costa Rica. [National fertility survey, 1976, Costa Rica] [SP] San José, Costa Rica, September 1978. (World Fertility Survey). 369 p. [Available, in Spanish, from the Dirección General de Estadística y Censos, Sección de Publicaciones, San José, Costa Rica, free of charge]

7. DOMINICAN REPUBLIC. CONSEJO NACIONAL DE POBLACION Y FAMILIA. Encuesta nacional de fecundidad: informe general. [National survey of fecundity: general report] [SP] Santo Domingo, Dominican Republic, Secretaría de Estado de Salud Pública y Asistencia Social, October 1976. (World Fertility Survey) 611 p. [Available, in Spanish, with separate list of table headings in English and French, from Consejo Nacional de Población, Apartado Postal 1803, Santo Domingo, Dominican Republic, free to libraries; payment of postage by others]

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11. INDONESIA. CENTRAL BUREAU OF STATISTICS. Indonesia fertility survey. Principal report. Vol. 2. Jakarta, Indonesia, Central Bureau of Statistics, 1978. (World Fertility Survey) 278 p. [Available, in English, from the ISI]

12. JAPAN. MINISTRY OF HEALTH AND WELFARE. STATISTICS AND INFORMATION DEPARTMENT. The 1974 Japan national fertility survey: a summary of findings. March 19, 1979. [World Fertility Survey, Japan. February 1979] (Unpublished)

13. KOREA. ECONOMIC PLANNING BOARD. NATIONAL BUREAU OF STATISTICS and THE KOREAN INSTITUTE FOR FAMILY PLANNING. The Korean national fertility survey. First country report, 1974. Seoul, Korea, National Bureau of Statistics, December 1977. (World Fertility Survey) 863 p. [Available, in English, from the ISI]

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18. NEPAL. MINISTRY OF HEALTH. FAMILY PLANNING AND MATERNAL CHILD HEALTH PROJECT. Nepal fertility survey, 1976. First report. Kathmandu, Nepal, His Majesty's Government, August 1977. (World Fertility Survey) 347 p. [Available, in English, with list of key terms in French and Spanish, from the ISI]

19. PAKISTAN. POPULATION PLANNING COUNCIL. Pakistan fertility survey. First report. Islamabad, Pakistan, Population Planning Council of Pakistan, October 1976. (World Fertility Survey) 320 p. [Available, in English, from the Population Planning Division, Government of Pakistan, Islamabad, Pakistan, free of charge]

20. PANAMA. OFICINA DE ESTUDIOS DE POBLACION. Encuesta de fecundidad. Informe general. Panama, 1977. [Fertility survey. General report. Panama, 1977] [SP] Panama, November 1977. (World Fertility Survey) 485 p. [Available, in Spanish, from the Ministerio de Salud, Oficina de Estudios de Población, Apartado 2048, Panama 1, Panama, free of charge]

21. SPAIN. MINISTERIO DE ECONOMIA. INSTITUTO NACIONAL DE ESTADISTICA. Encuesta de fecundidad, diciembre 1977. Metodología y resultados. [Fertility survey, December 1977. Methodology and results] [SP] Madrid, Instituto Nacional de Estadística, May 1978. 254 p.

22. SRI LANKA. MINISTRY OF PLAN IMPLEMENTATION. DEPARTMENT OF CENSUS AND STATISTICS. World fertility survey. Sri Lanka. 1975. First report. Colombo, Sri Lanka, Department of Census and Statistics, March 1978. (World Fertility Survey) 713 p. [Available, in English, with translation of terms found in the tables in French and Spanish, from the ISI]

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Country Summaries

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37. WORLD FERTILITY SURVEY. The Indonesia fertility survey, 1976: a summary of findings. Voorburg, Netherlands, International Statistical Institute, October 1978. (World Fertility Survey 11) 9 p.

38. MOORS, H.G. The Netherlands survey on fertility and parenthood motivation, 1975: a summary of findings. Voorburg, Netherlands, International Statistical Institute, December 1978. (World Fertility Survey 12) 14 p.

39. WORLD FERTILITY SURVEY. The Bangladesh fertility survey, 1975: a summary of findings. Voorburg, Netherlands, International Statistical Institute, April 1979. (World Fertility Survey 13) 12 p.

World Fertility Survey Basic Documentation

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47. WORLD FERTILITY SURVEY. Guidelines for country report no. 1. Voorburg, Netherlands, International Statistical Institute, December 1977. (World Fertility Survey Basic Documentation 8) 185 p.

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50. WORLD FERTILITY SURVEY. Coding of occupation: a revision of appendix 4 of the WFS editing and coding manual. Voorburg, Netherlands, International Statistical Institute, January 1978. (World Fertility Survey Basic Documentation) 3 p.

51. WORLD FERTILITY SURVEY. Guidelines for data processing. London, International Statistical Institute, February 1979. (TECH. 1010) 215 p. (Mimeo)

Occasional Papers

52. DUNCAN, W.G. Fertility and related surveys. Voorburg, Netherlands, International Statistical Institute, October 1973. (World Fertility Survey Occasional Papers 1) 32 p.

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55. BAUM, S., DOPKOWSKI, K., DUNCAN, W.G., and GARDINER, P. World fertility survey inventory: Africa 1960-1973. Voorburg, Netherlands, International Statistical Institute, April 1974. (World Fertility Survey Occasional Papers 4) 47 p.

56. BAUM, S., DOPKOWSKI, K., DUNCAN, W.G., and GARDINER, P. The world fertility survey inventory: major fertility and related surveys conducted in Latin America 1960-1973. Voorburg, Netherlands, International Statistical Institute, April 1974. (World Fertility Survey Occasional Papers 5) 28 p.

57. BAUM, S., DOPKOWSKI, K., DUNCAN, W.G., and GARDINER, P. World fertility survey inventory: Europe, North America and Australia 1960-1973. Voorburg, Netherlands, International Statistical Institute, April 1974. (World Fertility Survey Occasional Papers 6) 20 p.

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67. SAHIB, M.A. The Fiji fertility survey: a critical commentary — appendices. Voorburg, Netherlands, International Statistical Institute, April 1975. (World Fertility Survey Occasional Papers 16) 151 p.

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Technical Bulletins

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Scientific Reports

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Annual Reports

78. WORLD FERTILITY SURVEY. The World Fertility Survey: the first three years: January 1972-January 1975. Annual Report. Voorburg, Netherlands, International Statistical Institute, 1976. 66 p.

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81. WORLD FERTILITY SURVEY. The World Fertility Survey: January 1977-December 1977. Annual Report. Voorburg, Netherlands, International Statistical Institute, 1978. 95 p.

82. WORLD FERTILITY SURVEY. The World Fertility Survey: January 1978-December 1978. Annual report. Voorburg, Netherlands, International Statistical Institute. [1979] 91 p.

Descriptive Brochure

83. INTERNATIONAL STATISTICAL INSTITUTE [ISI]. INFORMATION OFFICE. World Fertility Survey. [Descriptive brochure] Voorburg, Netherlands, ISI, May 1973. 8 p.

III. Articles on the World Fertility Survey

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85. BRACKETT, J.W. and RAVENHOLT, R.T. The potential demand for voluntary sterilization: some findings from the World Fertility Survey. Presented at the Fourth International Conference on Voluntary Sterilization, Seoul, Korea, May 8, 1979. 12 p.

86. BRACKETT, J.W., RAVENHOLT, R.T., and CHAO, J.C. The role of family planning in recent rapid fertility declines in developing countries. Studies in Family Planning 9(12): 314-323. December 1978.

87. CHAO, J.C. Rapid fertility decline observed in the Dominican Republic. 1976. 9 p. (Unpublished)

88. CHO, L.J. Fertility preferences in five Asian countries. International Family Planning Perspectives and Digest 4(2): 2-8. Spring 1978.

89. CHOE, E., ed. General feature of sampling procedure for the World Fertility Survey, Korea, 1974. Journal of Family Planning Studies 3: 84-118. April 1976.

90. CLELAND, J.G., LITTLE, J.A., and PITAKTEPSOMBATI, P. Socio-economic determinants of contraceptive use in Thailand. Presented at the annual meeting of the Population Association of America, April 26-28, 1979, Philadelphia, Pennsylvania. [To be published as a World Fertility Survey Scientific Report]

91. GARDINER, P. and MILLER, W. An inventory and discussion of selected characteristics of 41 past fertility (and fertility related) surveys. (Prepared for the First Ad Hoc Technical Advisory Meeting of the World Fertility Survey, The Hague, July 11-14, 1972) June 19, 1972. 63 p. (Unpublished)

92. HOBCRAFT, J.H. Evaluating fertility levels from WFS data: the case of Colombia. Presented at the Annual Meeting of the Population Association of America, April 26-28, 1979, Philadelphia, Pennsylvania. 18 p.

93. RAVENHOLT, R.T., BRACKETT, J.W., and CHAO, J.H. World Fertility Survey: findings and implications. Presented at the annual meeting of the American Public Health Association, October 30-November 3, 1977, Washington, D.C. 27 p.

94. RODRIGUEZ, G. Family planning availability and contraceptive practice. International Family Planning Perspectives and Digest 4(4): 100-115. Winter 1978.

95. SINGH, S. Comparability of questionnaires for the 10 countries with published reports. [Prepared for the United Nations Working Group on Comparative Analysis of World Fertility Data, Second Meeting, October 31-November 2, 1978. Geneva, Swirtzerland] London, International Statistical Institute, August 10, 1978. 39 p. (Mimeo)

96. SINGH, S. Comparison of individual survey tables of Country Report No. 1 for the 10 countries with published reports. [Prepared for the United Nations Working Group on Comparative Analysis of World Fertility Data, Second Meeting, October 31-November 2, 1978, Geneva, Switzerland] London, International Statistical Institute, September 7, 1978. 78 p. (Mimeo)

97. SPREHE, T. The World Fertility Survey: an international program of fertility research. Studies in Family Planning 5(2): 35-41. February 1974.

98. TSUI, A.O., BOGUE, D.J., and HOGAN, D.P. A work plan for a family planning analysis of World Fertility Survey data. Chicago, Illinois, University of Chicago. 1978. 134 p.

99. UNITED NATIONS FUND FOR POPULATION ACTIVITIES [UNFPA]. The United Nations programme for comparative analysis of World Fertility Survey data: a project of the United Nations carried out in collaboration with the United Nations Fund for Population Activities. New York, UNFPA. 1979. 480 p. [In press]

100. WESTOFF, C.F. The unmet need for birth control in five Asian countries. Family Planning Perspectives and Digest 10(3): 173-181. May-June 1978.

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CONDOM•DIAPHRAGM•FOAM•SPERMICIDE

Population Reports

Series H
Number 5
September 1979

BARRIER METHODS

Population Information Program, The Johns Hopkins University, Hampton House, 624 North Broadway, Baltimore, Maryland 21205, USA

Spermicides—Simplicity and Safety Are Major Assets

Summary. A decade ago, when hopes were high for new and better contraceptives, there seemed little room in expanding public and private family planning programs for such a simple and old-fashioned method as vaginal spermicides. Even now other methods offer advantages which jellies, creams, foams, foaming tablets, and suppositories seem to lack. Oral contraceptives, for example, provide convenient, nearly 100 percent effective protection for young, fertile women; IUDs are appropriate and almost equally effective for women who have had children; and sterilization is both effective and relatively free of side effects for couples who want no more children.

Is there any role for vaginal chemical spermicides? Are they effective? Do they make a useful contribution to voluntary family planning programs?

The answer is yes. If used properly, spermicides can be more than 95 percent effective. Even if they are not used properly all the time, spermicides are about 85 percent effective and meet important needs that other methods may not. They are:

- **safe**, with no proven systemic side effects or even any serious local reactions
- readily **available** from commercial sources without the need for a medical consultation or prescription
- **useful** as a simple, easily understood introduction to fertility control
- **convenient** for use by couples who have intercourse infrequently
- **appropriate** for short-term use or for adjunct use with other methods
- **acceptable** to women who might not otherwise use family planning and
- probably to some degree **protective** against venereal disease and certain other sexually related infections.

Spermicidal products available today come in five different forms: creams, jellies, foams in pressurized containers, foaming tablets, and suppositories. Each consists of (1) a relatively inert base material which physically blocks the passage of sperm and simultaneously serves as a carrier for (2) a chemically active ingredient, or spermicide, which incapacitates the sperm before it can reach the ovum. Base materials vary considerably, but most modern products rely on a single spermicide, commonly known as nonoxynol-9, to immobilize the sperm. A notable exception is the Japanese product Neo Sampoon foaming tablets, which contains TS-88, or menfegol. The safety of nonoxynol-9 and TS-88 are well-established, and an advisory panel of the US Food and Drug Administration has recommended classifying them safe and effective.

Availability

The availability of spermicidal methods is a major asset for any potential user in areas where doctors and clinics are scarce. Spermicides can be widely sold not only by chemists, or pharmacists, but also by vendors in small shops and bazaars. Moreover, they can often be advertised and promoted without rousing the opposition that has greeted attempts to advertise condoms or oral contraceptives to the public. As a result, community-based and social marketing programs either have added or plan to add spermicides to their product lines in 17 countries—Bangladesh, Brazil, Colombia, the Dominican Republic, Ecuador, Egypt, Grenada, Guatemala, Haiti, Mexico, Morocco, Panama, St. Vincent, South Korea, Sri Lanka, Thailand, and Tunisia. New programs utilizing spermicides may soon start in Nigeria, Peru, and Sudan.

Spermicide users comprise only a small segment of contraceptors in the developed countries—not more than five percent—and an even smaller segment in the developing countries. Use is highest in Latin America, where World Fertility Survey data from Colombia, Costa Rica, the Dominican Republic, Mexico, Panama, and Peru show that about 1 to 3 percent of exposed women are using spermicides. In Africa, spermicides are widely distributed

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This issue of **Population Reports** was prepared by Samuel Coleman, Ph.D., and Phyllis T. Piotrow, Ph.D., of the Population Information Program on the basis of published and unpublished materials, correspondence, and interviews. Comments and additional material are welcome.

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Phyllis T. Piotrow, Ph.D., Director; Helen K. Kolbe, M.S., Co-Director; Ward Rinehart, Editor.

in Ghana but very little elsewhere. Use in Asia appears to be minimal. Nevertheless, there is evidence that foaming tablets and suppositories are becoming more popular in both developed and developing countries.

The appropriateness, convenience, and acceptability of spermicidal methods must be judged by each user, taking into account her own circumstances. As an introduction to modern family planning, vaginal methods can be used as the logical next step from traditional methods, such as herbs and douches, already used in many cultures. If a male partner will not use condoms, use of spermicides provides a female alternative. Similarly, spermicides can be used temporarily when other methods are not available, for example after orals have been forgotten for several days, after an IUD has been expelled, or for the first few months after vasectomy. In fact, spermicides are often chosen not so much because of the advantages they offer as because of the disadvantages users see or fear in other methods.

Two major disadvantages limit the use and usefulness of spermicides: first, they must be applied shortly before each act of intercourse, a serious deterrent for women who are inhibited, lack privacy, or have uncooperative partners; and, secondly, they have higher failure rates than sterilization, orals, IUDs, or condoms. In fact, among US women using contraception surveyed in 1976, about 15 percent of spermicide users became pregnant within the first 12 months of use, compared with 2 percent of pill users, 4 percent of IUD users, and 10 percent of condom users (199).

Effectiveness Debated

Evaluating the effectiveness of spermicides is difficult since the major problem is not a failure of the product itself but a failure of the user to apply the product correctly and above all consistently. Studies show that patients in small clinical studies run by private physicians have lower failure rates—about one to seven pregnancies per 100 woman-years—than women questioned in nationwide surveys or women whose records are taken from hospitals or clinics—about 3 to over 20 pregnancies per 100 woman-years. On one hand, this may reflect the individual characteristics of these women—higher education, longer use, or stronger motivation. On the other hand, lower failure rates may also reflect greater care and effort on the part of the provider—to insure that women understand how to insert and use spermicides and that they appreciate the need for consistent, conscientious use. Differences among widely used formulations such as Delfen Foam, Emko, Conceptrol, Neo Sampoon, and Patentex Oval/Encare may be less than the differences among users or among providers.

Yet present spermicides are far from perfect. For the long run, research to identify longer acting, more effective, and more acceptable spermicides is in order. At present only a modest sum—approximately one million dollars annually—is spent for research on barrier methods, largely by commercial firms, and no promising new spermicides are in sight. For the short run, instructions, packaging, person-to-person counseling, and promotion could be much improved with relatively little cost and effort.

At present the role of the distributor or provider is crucial to both the acceptability and the effectiveness of vaginal contraceptives. While physicians and statisticians in developed countries may argue whether the failure rates of various new spermicides are 1, 5, or 15, health personnel in developing countries have to focus on their responsibility to contact and gain additional acceptors and to help them all use the most appropriate method in the most effective way. Program administrators must recognize that as more new acceptors are recruited through community-based or commercial efforts, failure rates will probably also go up. Nonetheless, giving spermicides their place beside other methods may fill the special needs of certain women and provide contraception for some who otherwise would do without.

End of Summary

HISTORY

Vaginal contraceptive preparations are among the oldest and simplest of all techniques to prevent conception. Egyptian papyri dating back to about 1850 BC offer the first written instructions for vaginal contraceptives, made with honey and natron (native sodium carbonate), and for various types of irrigating, plugging, and gummy substances to insert in the vagina before coitus. Prescriptions of a mixture containing animal dung—either crocodile or elephant—first appear in the ancient papyri and continue to be mentioned by writers in the Mediterranean area over a span of 3,000 years (84). From ancient Egypt to the present, various substances, often highly acidic, with pastelike or sticky bases, have been employed as vaginal contraceptives. Since highly acidic substances immobilize sperm, some of these primitive combinations may well have had some effect in reducing fertility.

Not until the late 19th century, however, did vaginal contraceptives emerge from folklore and ancient medical texts into the realm of everyday use. In England, the 1881 trial of Charles Bradlaugh and Annie Besant, for reprinting a pamphlet advocating douching, publicized, more than any deliberate advertising could have, the fact that simple vaginal methods of contraception were available and could be used without consulting the disapproving medical profession. The impact of the Bradlaugh-Besant trial is best indicated, as Norman Himes pointed out, by sales of the pamphlet, which jumped from a thousand copies annually before the trial to 185,000 copies in the 3½ years following (84). In fact, despite the opposition of the medical profession, the last two decades of the 19th century saw a tremendous expansion in the manufacture, advertising, and marketplace and mail-order distribution of a profusion of contraceptive methods. As John Peel points out, "With the exception of the oral contraceptive, there is not a single birth control method in existence today which was not already available and available in greater varieties in 1890" (137).

Among the first of the commercial spermicidal products were the quinine pessaries developed by Walter Rendell, an English pharmacist, in 1885. These suppositories consisted of soluble cocoa butter plus quinine sulfate, a common drug of the time but not, it later became known, a very potent spermicide. In most of the numerous early chemical spermicides, quinine sulfate was the active ingredient. Chinosol, lactic acid, and boric acid were also utilized, commonly with a cocoa butter or gelatin base (138).

In the total absence of scientific testing or government regulations, many formulations were ineffective and some, in strong doses, were irritating to the users. Nevertheless, they provided for the first time commercial contraceptive methods within the means of all but the poorest British and American families.

As early as the 1920s, scientific research on spermicidal methods was initiated (138, 156). The US National Committee on Maternal Health hoped to develop a vaginal contraceptive that could serve as "an effective germicide for the spirochete and the gonococcus—in other words a spermicide combined with a prophylactic for venereal disease." These hopes are still not entirely realized, but this research, funded by US organizations but undertaken in England, was one of the first scientific efforts to evaluate and improve any type of contraception (138).

An important innovation in spermicidal methods was the use of the effervescent tablet, which foams when it comes into contact with moisture, as a spermicidal preparation.

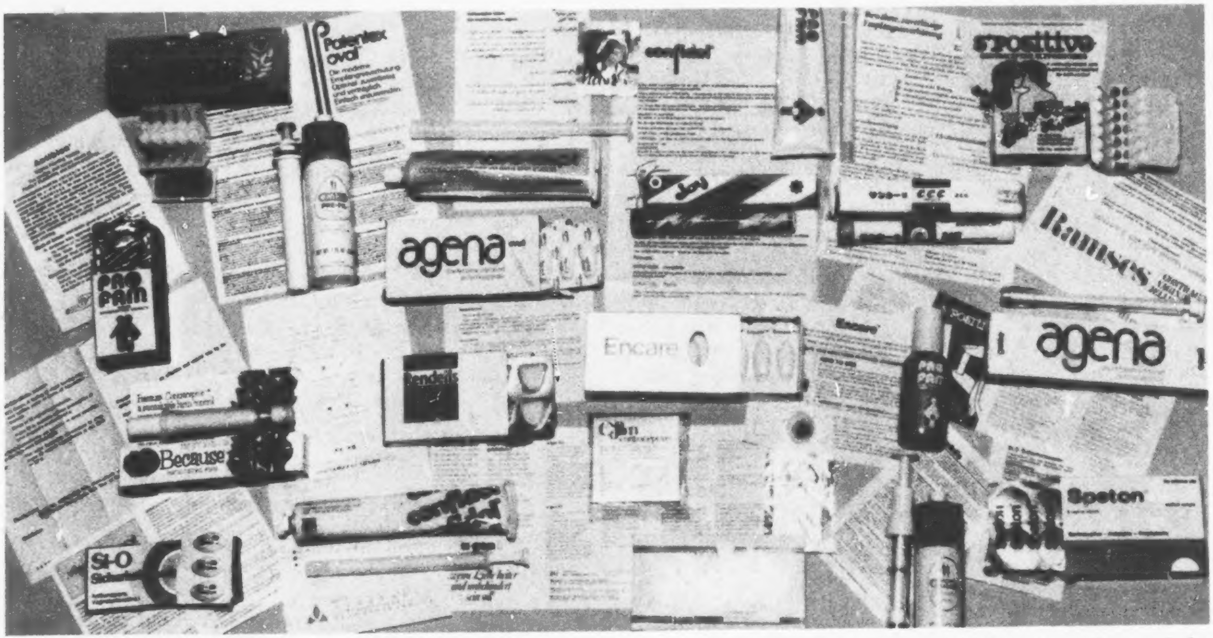


Figure 1. The brands of spermicides available on commercial markets are many. The forms of spermicidal contraceptives and the inert ingredients they contain vary considerably, but most products rely on a single active ingredient, nonoxynol-9.

First available in the 1920s, this was a development of the German pharmaceutical industry (138).

A further important improvement in technology was the introduction in 1937 of phenylmercuric acetate (PMA) as a spermicide, in the product Volpar. Even if recent concerns about the safety of mercury have since virtually banished mercuric compounds from the US market, PMA offered greater spermicidal effectiveness than such substances as quinine sulfate.

While spermicides were somewhat improved during the early twentieth century, the technological development of condom manufacture proceeded even faster. Advances in the use of latex rubber permitted the cheap mass production of thin yet strong condoms. Since the condom was recognized as a prophylactic against venereal disease and an effective contraceptive, its use generally surpassed that of the spermicides, many of which were overpromoted and failed to live up to the expectations of manufacturers and users.

The next important technological advance in the history of spermicides was the introduction of surfactants, or surface active agents, in the 1950s. Acting primarily by disrupting the integrity of the sperm membrane, surfactant spermicides are not strongly acidic and are rarely irritating to the vagina or penis. They are now the principal active ingredient in spermicidal products. They have been combined with different bases in a variety of forms, including jellies, creams, suppositories, foaming tablets, and foams in pressurized containers (see Table 1, p. H-106). Spermicidal contraceptives now sell on the commercial market at prices ranging roughly from $.10 to $.40 (US) per dose, the price depending more upon the brand and the place of sale than upon the form.

Contraceptive foams in pressurized containers, commonly called aerosols, first appeared in the late 1950s. They are usually applied by filling an applicator, like that used for jellies and creams, from the pressurized can. In the early 1970s, the Emko Company introduced applicators that could store a single dose for up to seven days and a combination container-applicator that holds six premeasured doses. Foams disperse well in the vagina (98) and, like jellies and creams and in contrast to foaming tablets and suppositories, they require no waiting between application and coitus.

In the last few years, attention has returned to suppositories and foaming tablets. The major international producer of foaming tablets is the Eisai Company, a Japanese firm, which markets Neo Sampoon loop foaming tablets, with a relatively new surface active agent, p-methanylphenyl polyoxyethylene (8.8) ether, commonly known as TS-88 or menfegol. They sell in tubes of 20 for about $.10 (US) per tablet. Eisai has vigorously promoted Neo Sampoon tablets in many parts of the developing world, and they are now gaining in popularity. This commercial promotion has sometimes paved the way for family planning programs supplying spermicides. Ortho Pharmaceutical Corporation holds the license for Neo Sampoon in the US, but Ortho has applied to the US Food and Drug Administration for new drug approval, which requires a review of safety and effectiveness. Therefore marketing of the product in the US is not expected soon.

In West Germany, Patentex GmbH has recently developed a solid product that, according to the manufacturer, both melts and foams. The Patentex Oval, or Encare, as it is known in the US, is being vigorously promoted despite controversy over early advertised claims of high effectiveness (see box, p. H-92). The product sells in the US for about $.35 per suppository.

Another innovative vaginal contraceptive is the water-soluble film known as C-Film. Originally developed in Hungary, C-Film is licensed for manufacture and sale by several companies in developed countries. As with many spermicides, clinical trials have produced mixed results (135, 174), and the effectiveness of C-Film remains in doubt.

The history of vaginal contraception is essentially a history of small improvements and marginal advances. Although family planning experts hope that further research will produce a more effective product, presently the extent of use of spermicidal methods appears to depend less upon marginal improvements in the product itself than upon vigorous promotion, wider availability, lower costs, and a more active effort to encourage consistent use.

USAGE

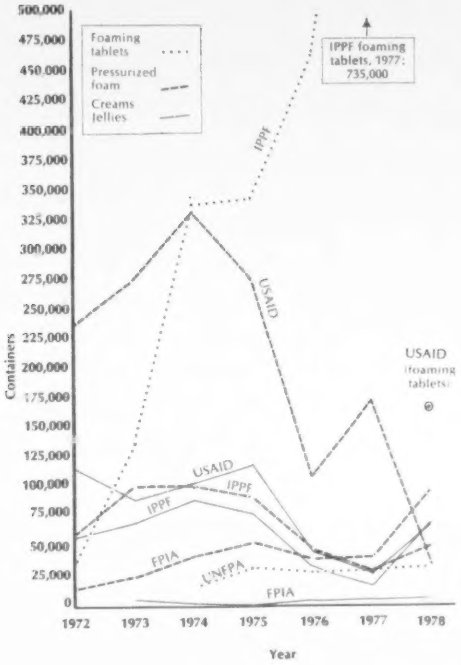
Neither in developing nor in developed countries do more than a small percentage of all contraceptors use spermicides. There is, however, some evidence that use of foaming tablets may be on the rise. In the developed countries, where spermicides are widely available through commercial outlets, the low usage rate may largely reflect user preferences. In developing countries, the even lower usage rate relative to other methods probably also reflects availability, since spermicides are not supplied in large quantities by most international donor agencies. (But international shipments partly reflect demand, and thus the two cannot be completely separated.) Many of the international supplies have gone to social marketing or community-based distribution programs for which spermicides, like condoms and oral contraceptives, are particularly appropriate.

The experience of Ghana indicates that spermicides might find more use in developing countries. For the past few years Ghana has been the major recipient of spermicides from international donors. In 1977, enough spermicides were either supplied to or distributed by Ghanaian family planning programs to provide roughly 65,000 couple-years of contraception.

Developing Countries

Shipments from international donor agencies suggest that Latin America has the highest proportion of spermicide users in the developing world. Africa ranks second, with Asia clearly third. In no country in the world are spermicides filling the contraceptive needs of a substantial portion of the population. Worldwide, the use of pressurized

Figure 2. Donor Agency Deliveries of Spermicidal Contraceptives, by Product Type, 1972-1978



Note: For data on which this figure is based, see Table 2-5, pp. H-110–112. UNFPA foaming tablet purchases in 1977 incomplete due to outstadning purchase orders.

Source: FPIA (140), IPPF (36, 94, 177), UNFPA (12), USAID (196)

foams, jellies, and creams has been fairly constant over the past decade, but the use of foaming tablets appears to be increasing.

Estimating distribution and actual use of spermicides is difficult. Spermicides are sold without prescription and therefore are not easily monitored except by manufacturers and commercial distributors, who do not make public their sales figures. Surveys of contraceptive use yield the best data because they include all users, whether supplied by commercial sources or by family planning programs. Such surveys are infrequent, however, and often, as in the World Fertility Surveys, spermicide users are so few that they are included in a single category with users of diaphragms and, sometimes, douching. Inventories of acceptors or of products distributed in family planning programs indicate roughly how many people are served through these channels, but trends are difficult to detect in supplies data because programs often take in a large stock one year and distribute it over several years.

The major donor agencies that distribute spermicides are the US Agency for International Development (USAID), the International Planned Parenthood Federation (IPPF), and Family Planning International Assistance (FPIA). In comparison with oral contraceptives, IUDs, and condoms, spermicides are supplied in small quantities. For example, in 1977 USAID supplied over 92 million cycles of oral contraceptives, or 7.1 million couple-years of contraceptive protection (see **Population Reports**, Series A, Number 5, *OCs—Update on Usage, Safety, and Side Effects*, January 1979); the total protection provided by USAID-supplied spermicides in the same year, assuming 100 acts of coitus per year (202), was less than 9,000 couple-years (see Table 2 and Figure 2; for Tables 2-6, see pp. H-110–114).

Deliveries of foams, jellies, and creams by USAID and FPIA, both of which handle requests for supplies made through USAID country missions, peaked in the mid-1970s. In the 4-year period between 1971 and 1974, the two organizations supplied about 940,000 containers of foam in 90-gram units or equivalent, half of it in 1974 alone, and 368,000 tubes of jellies and creams. In the subsequent 4-year period, 1975 to 1978, the figures were 879,000 for pressurized foams and 261,000 for jellies (see Tables 2 and 3). The number of countries receiving these spermicides has also declined from more than 35 in 1974 to fewer than 20 in 1978.

In 1978 USAID shipped a large quantity of Neo Sampoon foaming tablets to seven countries for research purposes (see Table 2). A total of 55,000 20-tablet tubes or equivalent went to new social marketing programs in Ghana, Sri Lanka, and Egypt, where they will be sold at a reduced price. Some 25,000 tubes or equivalent went to community-based distribution programs in Thailand, and 33,000 went to operations research projects in Tunisia, Korea, and Ecuador.

In recent years IPPF deliveries of spermicides have varied from year to year (see Table 4). Most shipments have gone to Latin American countries. Costa Rica, Colombia, Ghana, and Guatemala were the major recipients of jellies in 1978; Tanzania, Pakistan, and Nicaragua, of pressurized foams; and Ghana, the Philippines, Colombia, and Nicaragua, of foaming tablets.

Recently the United Nations Fund for Population Activities has supported purchases of Neo Sampoon foaming tablets requested by developing countries (see Table 5). The quantities are small—only 32,650 tubes for 12 countries in 1978. Mauritius has been the major recipient, receiving 15,000 tubes in 1978.

Data on program distribution collected by IPPF affiliates since 1975 show that the use of foaming tablets more than doubled between 1975 and 1977, the last year for which data are available, when 6.3 million tablets were distributed (see Table 6). The largest single user of foaming tablets in this period was Ghana, and use there grew faster than in the rest of the world. In 1977 the Ghanaian National Family Planning Association distributed 160,000 tubes of Neo Sampoon foaming tablets—half of all tablets distributed by IPPF affiliates around the world. Use of IPPF foaming tablets in Ghana may have peaked in 1978 at 200,000 tubes (53). Excluding Ghana, Latin America was the major area where tablets from IPPF were used. Latin American use increased dramatically in two countries, but on different scales. In Colombia, use of foaming tablets increased fivefold between 1975 and 1977, to 80,000 tubes. In Guatemala, use increased eightfold in the same period, to over 8,000 tubes. Use of pressurized foams distributed by Profamilia, the Colombian IPPF affiliate, also increased, from 4,200 containers in 1975 to 12,000 in 1977. Substantial increases of this sort seem to result from the decisions of family planning programs to promote spermicides (88). On a worldwide basis, use of IPPF-supplied jellies and pressurized foams remained constant. Assuming 100 applications per year, in 1977 all IPPF-supplied spermicides provided over 100,000 couple-years of contraception in 60 developing countries.

World Fertility Surveys provide information about spermicide use in developing countries that includes purchases from commercial sources as well as distribution by family planning programs. Currently, data are available from six Latin American and nine Asian countries. While the data do not distinguish between spermicides and diaphragms, presumably most of the users are employing spermicides alone, since these are far more available than diaphragms, which require fitting, usually by trained personnel and in a clinical setting.

The World Fertility Survey data confirm the impression given by program and supply statistics that use of spermicides is slight. The proportion of currently married women exposed to the risk of pregnancy who use female local methods—that is, spermicides or diaphragms—ranges from virtually nothing in many of the Asian countries to roughly 3 percent in some Latin American countries (see Table 7). As might be expected, in most countries contraceptive users who are spacing births are more likely to use spermicides than those who want no more children.

Other recent survey data from Latin America show 2.1 percent of contraceptors in Costa Rica using vaginal methods, including spermicides (48), 3.7 percent in Mexico using female barrier methods or douche (47), and 1.9 percent in Paraguay using spermicides (8). In all three countries, spermicide use was more prevalent among contraceptors in urban areas than in rural areas; in fact, the smaller the city, the less spermicide usage as a percentage of all contraceptive use. This pattern may reflect the greater availability of spermicides in urban areas. It suggests that a market for spermicides could be developed in rural areas if products were available.

Lowering the price of spermicides or making them more widely available free of charge might increase their use (71). In a 1978 survey in Costa Rica, 77 percent of women who had used vaginal contraceptives reported having paid for them, compared with 18 percent of oral contraceptive users and 29 percent of IUD users (48). These figures raise the possibility that, in Costa Rica at least, programs providing free contraceptives did not meet the demand for spermicides as well as they did the demand for IUDs and pills.

Developed Countries

Once a major method of contraception in a number of developed countries, spermicides lost their popularity in the 1960s when more convenient and effective methods—the pill and the IUD—became available. Now, in most industrialized nations for which survey data are available, only from 1 to 3 percent of married women are using spermicides (see Table 8). While the percentages are small, the number of users is substantial. For example, the 3 percent of married US women using spermicides amounts to 825,000 women (146).

Table 7. Current Use of Female Local Methods, Including Spermicides, by Currently Married Women Exposed to Risk of Pregnancy in Developing Countries with Published World Fertility Survey Reports

Country & Year	Ref. No.	Of currently married exposed women, % using female local method[a]			Of currently married exposed women using contraceptives, % using female local method[a]		
		Total	Want more children	Want no more children	Total	Want more children	Want no more children
ASIA & PACIFIC							
Bangladesh (1976)	15	0	0	0	0	0	0
Indonesia (1976)[b]	90	0.4	0.2	0.6	1.1	0.8	1.1
Korea, Rep. of (1974)	107	0.4	0.2	0.4	0.9	1.2	0.7
Malaysia (1974)[c]	116	0.2	0.1	0.4	0.5	0.3	0.8
Nepal (1976)	129	0	0	0	0	0	0
Pakistan (1975)	133	0.2	0	0.5	2.7	0	3.3
Sri Lanka (1975)	180	0	0	0	0	0	0
Thailand (1977)	37	0.1	0	0.2	0.2	0	0.4
LATIN AMERICA							
Colombia (1976)	41	2.8	2.7	2.9	5.4	5.9	5.2
Costa Rica (1976)	49	2.1	2.2	1.7	2.7	3.1	2.0
Dominican Rep. (1975)[c]	57	2.8	2.9	2.8	6.8	11.7	4.9
Mexico (1977)	122	1.9	1.8	1.9	4.6	5.3	4.0
Panama (1976)	134	2.1	2.7	1.8	3.2	5.3	2.4
Peru (1977)[d]	156	1.1	1.1	1.2	2.7	3.0	2.6

NA = not available

[a] Female local method includes spermicides and intravaginal mechanical barriers

[b] Female local methods reported together with injection

[c] Douche included in female local methods

[d] Weighted sample

Table 8. Spermicide Use in Selected Developed Countries, as Reported in National Surveys, 1972-1977

Country	Ref. No.	Year	Population Surveyed	% of population surveyed currently using spermicides
Belgium	40	1975-1976	Currently married Dutch-speaking women aged 16-44	1
England & Wales	35	1975	Mothers and ever-married women aged 16-40	1
Italy	60	1976-1977	"People" aged 18-64	3
Japan	115	1977	Currently married women aged less than 50	6*
Poland	139	1972	Currently married women aged 16-49	
			Urban	3
			Rural	2
USA	65	1976	Currently married women aged 15-44	3

* Ever-use

With an estimated 5 percent of all women of reproductive age using spermicides (149), the Federal Republic of Germany probably has the highest usage rates in the world. This may be attributable to the active promotion in Germany of the Patentex Oval, which was introduced in 1973 and by 1978 had captured an estimated two-thirds of the spermicide market (85).

In the US, industry sources, while unwilling to divulge sales figures, report that sales are growing (13, 62, 194). Also, US family planning clinics saw requests for both foams and diaphragms grow modestly in the mid-1970s. In the 1972-1974 period, an average of 3.9 percent of clinic clients used foams; in 1975, 4.8 percent; in 1976, the most recent year for which data are available, 5.6 percent (191). No similar trend has been seen in US national survey data, however (see Table 9). In the most recent survey, conducted in 1976, foams, diaphragms, and rhythm were roughly equal in current usage by married women, behind the more effective methods of oral contraceptives, male and female sterilization, condoms, and IUDs, but ahead of the less effective methods, withdrawal and douching (64, 65). Slight changes in proportions between 1973 and 1976 among methods other than the pill should be interpreted cautiously because of the small numbers of survey respondents involved (65).

Because spermicides are used only at intercourse and are easily available through commercial channels, they are particularly convenient for young women who have intercourse infrequently (44). Reportedly these reasons help explain why spermicides are especially popular with young, unmarried women in West Germany (149). Young US women, in contrast, have not especially favored spermicides. In 1976, only 3.6 percent of unmarried women under age 20 with contraceptive experience listed spermicides as the most recently used method (166, 214), about the same percent as among married women (65).

ACCEPTABILITY

Acceptance of a contraceptive method rarely hinges on one characteristic; usually a whole cluster of characteristics affect use (163). The traditional view that use of vaginal products depends entirely on the product and on the motivation and conscientiousness of the user is now being questioned. Recent experience from a wide range of programs suggests that popularity and use of most contraceptive methods, including spermicides, can be influenced substantially by the actions and attitudes of family planning providers.

The Role of the Provider

The role of spermicide providers deserves attention but is often overlooked. These providers include both the commercial and community-based organizations which package, distribute, and promote spermicides and the health personnel who dispense them from clinics. Of the two, the nonmedical sources probably play a larger role in stimulating acceptance, but their activities are rarely discussed in medical or scientific publications unless a controversy develops.

Manufacturing and/or distributing organizations are responsible for insuring the easy availability of spermicidal products which, in most countries, can be sold without prescription or other medical intervention. They are also usually responsible for advertising and other promotions if legally permissible. Japan and West Germany provide good examples of the role commercial firms can play. In Japan an extensive promotional campaign for Neo Sampoon took place in the 1950s. The proportion of couples using contraception began to increase rapidly at that time and, even today, use of the tablets is greatest among women in their 40s. These older women, despite the greater sexual inhibitions of the older generation (10), chose tablets as their contraceptive at the time of the campaign (123, 126). When 671 German users of

Table 9. Contraceptive Methods Used by Currently Married Contracepting Women Aged 15-44 in the United States, 1973 and 1976

Method	Percent 1973	Percent 1976
Pill	36.1	32.8
Contraceptive sterilization, male	11.2	14.3
Contraceptive sterilization, female	12.3	14.1
Condom	13.5	10.6
IUD	9.6	9.0
Rhythm	4.0	5.0
Foam	5.0	4.4
Diaphragm	3.4	4.3
Withdrawal	2.2	2.9
Other	1.9	1.3
Douche	0.8	1.0

Source: Ford (65)

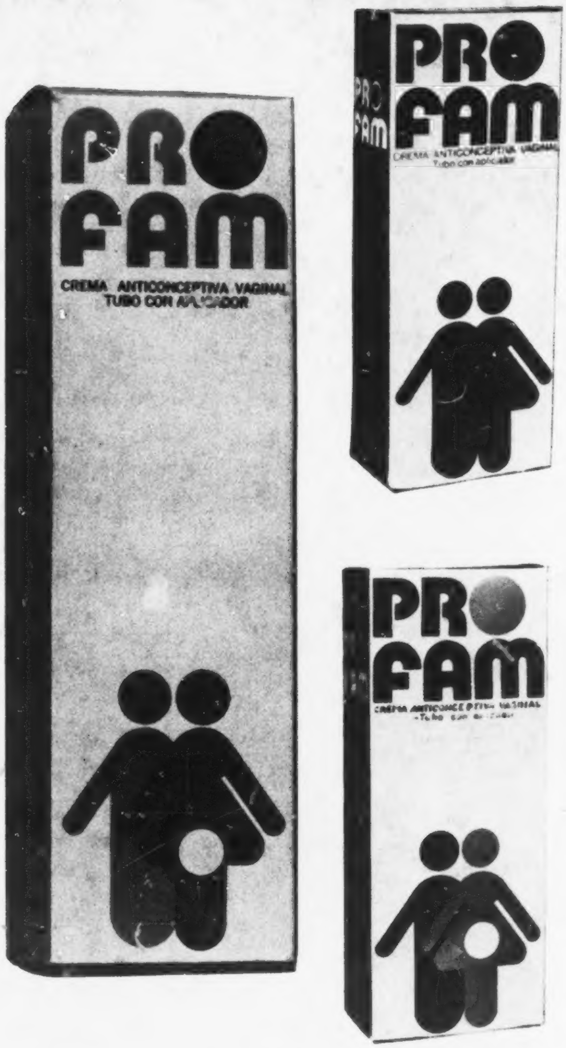


Figure 3. A group of Mexican women chose the design at left for spermicide package labeling used in the Mexican PROFAM social marketing program because the position of the circle communicated to them a "protective contraceptive meaning." By contrast, they took the design at upper right to symbolize a product for the whole family and the one at lower right to suggest a product to promote fertility. Also, the women selected aqua blue as the most attractive background color for the package. (PIACT de Mexico (148)

Patentex Ovals who had become pregnant and were surveyed in the Netherlands when they sought abortions were asked why they had chosen the product, 27 percent of the responses cited "advertising" and 19 percent, "easy availability." (Multiple responses were given.) In other words, a major stimulus for using Patentex Ovals stemmed from the actions and policies of the manufacturer (149). It is estimated that about 3 percent of German women are using Patentex Ovals, even though the product was only introduced in 1973 (149).

In the developing countries also, advertising and promotion have an impact on the acceptability of spermicides. In Colombia, for example, Neo Sampoon tablets were at first distributed without advertising, through a retail system operated by Profamilia, an affiliate of the International Planned Parenthood Federation. In 1978 Eisai, the manufacturer of Neo Sampoon, sponsored three months of one-quarter page advertisements in three major women's magazines. Sales of the product by Profamilia approximately quadrupled (52).

Another example of vigorous promotion techniques comes from Bangladesh, where Population Services International (PSI) has begun to market Neo Sampoon tablets under the brand name "Joy," with attractive packaging and advertising displays printed in Bengali. A 1979 marketing campaign was designed to sell 4,000 tubes in three months from 31 outlets in Dacca and Chittagong. As a result of effective advertising that described the product and its use, within two months nearly all the stock was sold out and vendors reordered another 3,000 tubes (7). PSI is not a commercial firm but rather a private, nonprofit agency, funded by the US Agency for International Development. PSI applies the methods of a commercial entrepreneur to contraceptive distribution.

Spermicides are also gaining in acceptability through innovative community-based distribution programs as well as through the variety of social marketing approaches, like that in Bangladesh, which have sprung up in recent years. The nationwide contraceptive education and commercial distribution program in Mexico, Programa de Educación y Distribución Popular de Productos Anticonceptivos (PROFAM), is distributing contraceptive suppositories made by Norwich Mexico and both a cream and a pressurized foam made by Lemery. Activities began in March 1979, and an estimated 18,000 outlets will be supplied in the first year of operation (54). In Egypt, IPPF will support a commercial distribution program in which individually wrapped tablets will be sold at drugstores under the trade name "Amaan" (52).

Packaging is important to product acceptability. PROFAM, with the help of the Programa para la Introducción y Adaptación de Tecnología Anticonceptiva (PIACT de Mexico), has carried out market research in order to devise a symbol for use on packaging that will insure correct identification and high acceptability for various contraceptives, including foam, cream, and suppositories, and will inspire confidence in the products. Discussion groups composed of Mexican women, both contraceptive users and nonusers, reviewed the stylized man and woman figures used as the PROFAM symbols, as well as different colors for the design. Figure 3 shows the alternative designs for female contraceptive packages. When the white circle was placed on the woman's abdomen, it was taken as a symbol of pregnancy, suggesting medicine to enhance fertility. Its absence vaguely suggested products for all members of the family. When the circle was placed on the lower edge of the woman's skirt, participants said that it elicited a "protective contraceptive meaning." The most appropriate color for the spermicidal cream and foam packages was found to be aqua blue, which evoked feelings of freshness (148).

Despite the value of advertising in increasing public acceptance, legal obstacles in both developed and developing countries stand in the way of full promotional efforts. Television advertising of barrier methods, for example, is forbidden in the United States and the United Kingdom.

Spermicides are marketed as feminine hygiene products in some countries where it is illegal to advertise contraceptives or where the manufacturers and the lay press have assumed that social and political conditions are unfavorable for the promotion of contraceptives. In Brazil, for example, spermicide products can be marketed only as feminine hygiene products, and in some countries of Francophone Africa contraceptive suppository packages contain instructions for use but no indication of their purpose (154).

Despite a few exceptions and the pioneering work of a handful of social marketing projects, however, most commercial spermicide manufacturers and distributors take a conservative approach to marketing. In a recent survey by Business International of contraceptive distribution operations in eight developing countries, one executive of a firm that manufactures oral contraceptives, condoms, and spermicides remarked:

> We are undoubtedly the most highly regulated industry and we manufacture products that continue to be controversial. If we are careful in our marketing, even unimaginative, it should not be difficult to understand why (32).

Manufacturers face a real dilemma. On one hand, where use of spermicides is low and commercial infrastructure in rural areas is lacking—as in Morocco, Nigeria, and Indonesia—manufacturers point out that public sector education about family planning is necessary before they can promote specific products. In any case, they note, the cost of products is too high for most of the population. On the other hand, in countries where spermicide use is greater and promises to increase—as in Costa Rica and the Dominican Republic—extensive government promotion and distribution programs are underway and manufacturers anticipate that free or subsidized government-supplied spermicides will destroy the market for commercial sales. Already in the Dominican Republic, women obtain spermicides free from government clinics, then sell them for $.50 to $1.00 to pharmacies (about one-half the wholesale price), and the pharmacies resell them at a profit (32). Even in Korea, where a local manufacturer advertises widely and sells about half a million 10-unit packages of spermicides annually, cooperation between the manufacturer and the government is not close. Government agencies regulate the industry, prohibit imports of contraceptive products, tax the raw materials required, and have tried to buy the product at a price that the company considered unprofitable (32).

The role of health care personnel—either private physicians or clinic staff—who recommend and/or dispense spermicides together with other contraceptives can also be important to the acceptance of these products. Spermicides appear so simple that a trained provider is not necessary, but if health care personnel take a negative attitude toward barrier methods, they discourage women who might prefer a local or occasional method or who would find spermicides a useful back-up to another method.

The importance of health care personnel is evident from multicenter clinical trials which find that complaints about side effects vary greatly from one center to another. In a study in Manila, one clinic experienced only about half as many complaints and one-fifth as many discontinuations for side effects as two other clinics (63). In Colombia, Guillermo Lopez and colleagues report, complaints at one Bogotá clinic were nearly twice as frequent as at another (114). In Guatemala, Luis Galich has observed that when medical and paramedical personnel are familiar with Neo Sampoon, demand for the product increases (70). When health personnel inform acceptors in advance, for example, that spermicides will provide additional lubrication and that foaming tablets may generate a feeling of warmth, the effects can be depicted as benefits rather than disadvantages.

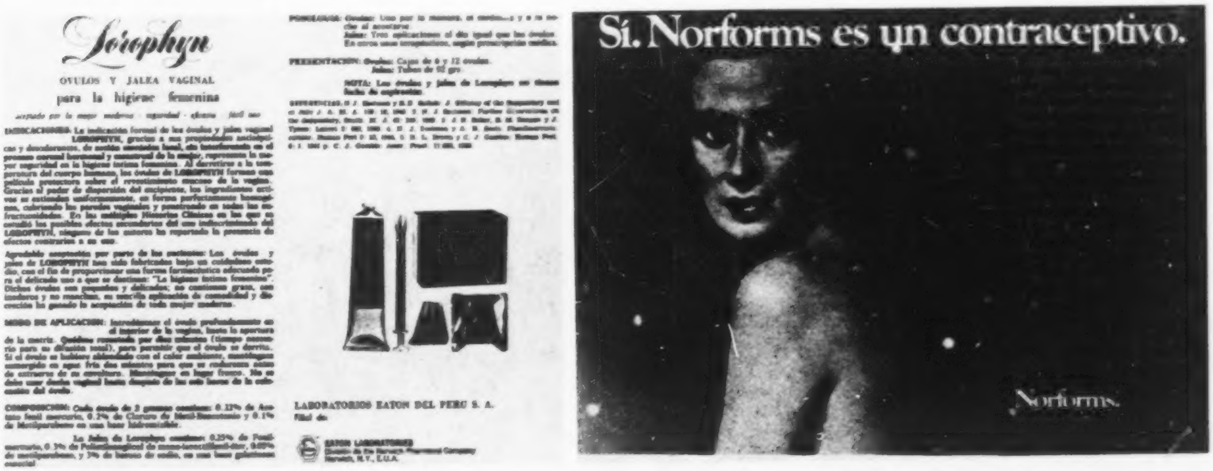

Lorophyn
OVULOS Y JALEA VAGINAL
para la higiene femenina
LABORATORIOS EATON DEL PERU S. A.
Sí. Norforms es un contraceptivo.
Norforms.

Figure 4. The old, cautious approach to marketing spermicides in Latin America contrasts with the new. The advertisement at left labels the contraceptive Lorophyn a feminine hygiene product only but tells the user to wait ten minutes for the suppository to disperse and to refrain from douching for six hours—instructions like those for most other contraceptive suppositories. In 1978, the same manufacturer began advertising its products in women's magazines in Guatemala, El Salvador, Nicaragua, and Honduras with the forthright declaration shown at right: "Yes. Norforms is a contraceptive."* (Norwich International)

*The product named Norforms in the United States is not a contraceptive.

It has been suggested that health care providers in the US are biased against barrier methods (44) and that many family planning workers have minimized their usefulness (23). Physicians may associate barrier methods with ineffective patent medications; they see couples for whom the method has failed and rarely encounter couples who acquire their spermicides through commercial outlets and use them successfully (143). A survey of family planning personnel in two US cities illustrates one way in which this bias operates. Respondents tended to rate the pill and the IUD according to theoretical effectiveness whereas they rated foam according to use-effectiveness or even lower (193).

The impact of such biases is not negligible. Gerald Bernstein reports that women who become pregnant after IUD expulsion or after running out of pills sometimes comment that they did not use barrier methods in the interval because "the nurse told me they are not much good anyway, so I didn't bother" (23). At Bernstein's facility, a California teaching hospital, staff who offered such advice were given additional instruction. In the hospital's family planning program, all postpartum clients were given foam or condoms or both. Those who chose the IUD or pills also received a supply of foam or condoms to use in case they forgot to take the pills or could not return to the hospital quickly in the event of an IUD expulsion (23).

In contrast to the skepticism of some professional health personnel in the United States, increased interest in barrier methods is developing through the women's self-care movement. Judy Norsigian of the National Women's Health Network estimates that approximately 10,000 US women are now served by about 200 health collectives. Although most of these organizations provide all legal methods of family planning, they encourage the use of barrier methods and urge that women play an active role in attending to their own health and contraceptive needs (31).

Product Characteristics

The reason spermicides can be distributed relatively easily through a wide variety of channels is to a large extent dependent on the nature of the products themselves. They are relatively easy to understand, not difficult to use, and completely safe. Safety is an important factor since it not only appeals to the user but also permits many forms of nonmedical distribution. (For discussion of spermicide safety, see pp. H-96–101.) These qualities attract many women, especially first-time users. As one researcher noted at the recent Program for Applied Research on Fertility Regulation (PARFR) International Workshop on New Developments in Vaginal Contraception in Guatemala,

> The preference for Patentex Oval especially among young, unmarried women is understandable. Patentex Oval is freely available and preeminently suitable for women having infrequent intercourse. Patentex Oval might be considered a female equivalent for the condom, in terms of being a method for beginners (149).

Probably the most important spermicide characteristic determining long-term acceptability is the fact that spermicides must be used at the time of sexual intercourse. On one hand, this feature appeals to women who have sexual relations infrequently, because it means that they can avoid effort, expense, and risk accompanying methods that must be used constantly without regard to coital frequency. On the other hand, it does not appeal to women or men who are not willing to interrupt lovemaking or prepare immediately in advance. Where privacy is lacking, all barrier methods can be awkward to use.

Other product-related factors that influence and sometimes reduce acceptability are the various physical sensations caused by spermicides. For example, some preparations noticeably increase lubrication, leave a liquid residue, or emit an odor. In postcoital tests a few couples have complained that Patentex Oval generated so much foam that friction during intercourse was diminished (30).

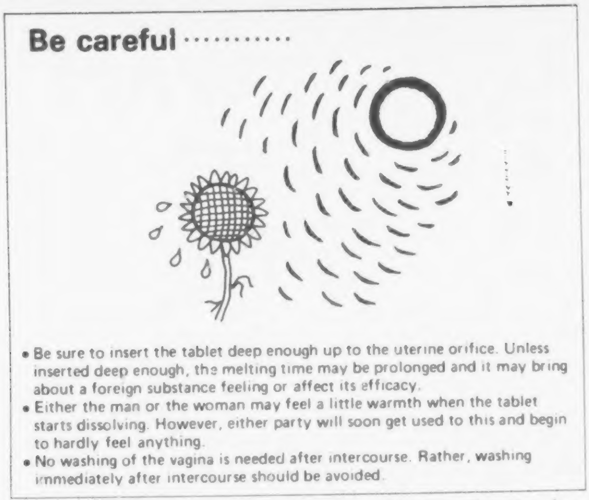
Foaming solid spermicides generate heat when dissolving, which both partners are likely to sense. This heat-releasing effect apparently disturbs some users but not others. In the Makati Clinic in Manila, over one-third of the 129 users studied complained of a strong heat sensation, but only 7 either changed contraceptive methods or dropped contraception entirely as a result of side effects (63). In a Japanese study of 587 couples, however, only 15 women complained of local irritation and none were reported discontinuing for that reason (96). In another study, 32 of 56 Japanese couples experienced unusual warmth from the tablets for one or both partners; of these couples, however, only four felt the sensation uncomfortable, and none rejected the method because of it (131).

For some users, the sensation of heat is pleasurable. In Ghana, men buy the foaming tablet because "it has a burning sensation that stimulates a lot" (76, 79). From the male Ghanaian point of view, foaming tablets are cheap, they are easy to carry, they are not messy, and, unlike condoms, they apparently add to rather than detract from sexual pleasure. In Lesotho also, men enjoy the sensation of heat produced by Neo Sampoon (190). In the Philippines, advertisements now cite the sensation of warmth as an added benefit (114); T-shirts read "Neo Sampoon – for that warm sensation."

Perceptions of the User

How the user herself regards spermicides is the ultimate test of acceptability. In addition to the role of the provider and the characteristics of the product, different factors contribute to each user's reaction, including cultural background, individual sexuality, a male partner's reaction, and, apparently to an increasing extent, comparisons with other methods.

Everyone is influenced by cultural background. Throughout the world, the user's expectation of "what good medicine should look like" can be critical in determining whether any product is used (16). If the form in which a contraceptive is administered resembles an already familiar and trusted medication, prospective users may be more inclined to try it. In a 1971 survey conducted in Guayaquil, Ecuador, for example, more women expressed a positive attitude toward foam tablets than toward any other form of barrier contraception because they identified foam tablets as a type of suppository. In Ecuador suppositories are commonly used for administering medica-



Be careful ....

- Be sure to insert the tablet deep enough up to the uterine orifice. Unless inserted deep enough, the melting time may be prolonged and it may bring about a foreign substance feeling or affect its efficacy.
- Either the man or the woman may feel a little warmth when the tablet starts dissolving. However, either party will soon get used to this and begin to hardly feel anything.
- No washing of the vagina is needed after intercourse. Rather, washing immediately after intercourse should be avoided.

Figure 5. The warmth when a foaming tablet dissolves is often noticeable, but most couples become accustomed to it, as this Neo Sampoon brochure states. In some places—Ghana, for instance—the warmth is a selling point. (Eisai Company)

tions (163). In rural Egypt, where folk methods of vaginal contraception, including herbs, lemon juice, and aspirin, have been passed from generation to generation (184), one would expect modern spermicides also to be readily acceptable (43).

Individual attitudes toward sexuality also influence attitudes toward contraception, but the strength of such influences is unclear and deserves more systematic investigation. In Lee Rainwater's interviews of 50 US working-class women and 45 men, he found that women who disliked sexual activity were more likely to dislike the consistent, active participation in contraception that vaginal methods require (150). Women who dislike touching their genitals would probably also dislike using spermicides.

Attitudes do change, however. Susan Scrimshaw suggests that in some culture groups such as Guatemalan Indians, women are not likely to accept vaginal contraception because of their strong dislike for touching their genitalia, but she also notes growing use of menstrual tampons among Hispanic groups in Latin America, who previously displayed a similar reluctance (163).

The male partner's attitude is also crucial since it is difficult for a woman to use vaginal contraceptives without his acquiescence (163). A husband may dislike his wife's advance preparation, signaling her expectation of intercourse. In Colombia, such dislike appears to be more prevalent among lower class couples (114). When solid spermicides are used, if a man is unwilling to wait for the suppository to melt, a woman is not likely to persist with the method.

Another factor that is increasing the acceptability of spermicides, diaphragms, and condoms is the anxiety some women are beginning to feel about the safety of the more effective methods such as pills and IUDs (14, 31, 44, 178). Even though these fears may be exaggerated, media publicity about the hazards of modern methods, especially oral contraceptives, has unquestionably made some women reluctant to use them. For example, one-third of the reasons for using Patentex Ovals listed by the 671 West German women seeking abortions in the Netherlands were in some way related to the pill; 18 percent cited "an antipill attitude," 14 percent cited using the spermicide during a pause in OC use, and 1 percent cited "pill complaints" (149). More than 50 percent of the "pill pause" group and about 20 percent of the "antipill attitude" group became pregnant within three months of use whereas the average was nine months (149). Although these data represent a specific subgroup of German women—using spermicides, becoming pregnant, and choosing to have an abortion in the Netherlands—they do suggest that women who shift from oral contraceptives to spermicides are especially vulnerable to unwanted pregnancy. At the same time, the availability of safe, legal abortion probably increases the willingness of some women in developed countries to use methods like spermicides that do have higher failure rates but that present no risk of systemic effects or other health hazards.

In the developing countries also, reluctance to use the pill, whether for health or other reasons, has been cited as a reason for the increasing use of spermicides. Such reports come from Bangladesh (161), Colombia (114), Costa Rica (32), the Dominican Republic (32), Guatemala (70), and South Korea (32). An executive of a Korean spermicide manufacturing firm, for example, admitted that the popularity of the spermicide was due as much to the deficiencies of other contraceptive methods and products as to the quality of his firm's products (32). He mentioned five reasons for the success of the products in Korea: (1) The public is aware of and has read articles on the findings of international groups on the possible linkage of hormonal contraceptives to heart disease and cancer. (2) Family physicians caution their female patients against using oral contraceptives. (3) Older women fear using orals. (4) Some women who will not take oral contraceptives are also unable to use an IUD. (5) Many people do not like to use condoms. In Costa Rica, the business manager of a firm that distributes various pharmaceutical products noted that among married couples, spermicides are far more popular than condoms since condoms are still associated with illicit sexual relations and prostitutes (32).

Recognizing that acceptability of a contraceptive method may be more strongly influenced by the perceived disadvantages of other methods than by the advantages of the method selected, firms that advertise spermicides often call attention to these disadvantages rather than to the specific benefits of the spermicide (see box p. H-92).

MEASURING EFFECTIVENESS

The major drawback of spermicides is the high failure rate often seen in actual use. Although a battery of laboratory tests shows that most spermicides do immobilize sperm, clinical studies and user surveys yield failure rates from as low as 0.3 pregnancies per 100 woman-years of use to as high as nearly 40, depending on the products used, the populations tested, and the type of instruction and support that is provided. (For a comprehensive review of earlier studies on spermicide effectiveness, see **Population Reports**, Series H, Number 3, *Vaginal Contraceptives: A Time for Reappraisal?*, January 1975.)

Today a renewed effort is underway to analyze all of the reasons for spermicide failure in order to identify the best ways to reduce failure rates in actual use. Gerald Bernstein and Robert Nakamura have identified three types of contraceptive failure applicable to spermicides that can be tested and evaluated independently:

- physiological (or method) failure, in which the product did not protect against pregnancy even though it was used correctly and consistently;
- psychological (or user) failure, in which the contraceptor failed to use the product at all or used it incorrectly despite adequate instructions; and
- procedural (or provider) failure, in which the contraceptor used the product incorrectly because the provider did not supply full and accurate guidance (24).

Table 10. Melting Time, Duration of Effectiveness, and Time before Douching Is Permissible, for Spermicidal Contraceptives, As Recommended in Manufacturers' Package Labeling and Package Inserts

	Time required to melt (in minutes)	Duration of effectiveness (in hours)	Time before douching is permissible (in hours)
FOAMING TABLETS			
Antibion	3-5	[a]	[b]
CCC	2-5	[a,c,d]	NS
Neo Sampoon	2-10	[a,c]	NS
Semori	3-4	[a]	NS
Speton	5	NS	1
SUPPOSITORIES & OTHER INSERTS			
A-gen 53	8-10	2[a]	6-8
Agena	5	2[a]	6
Encare (foaming)	10	1[a,e]	6
Lorophyn	15	[a,e]	6
Norforms	15	[a,e]	6
Patentex Oval (foaming)	10	2[a]	NS
Profam	10	NS	8
Rendells	3-5	[a,c]	6
Semicid	15	[a,e]	6
Si-O-Safety Oval	3	NS	NS
S'positive (foaming)	5-8	2[a]	6
Ta-ro-cap	5	3[a]	NS
JELLIES			
Agena		NS	NS
Patentex		[a,f]	NS
Ramses		[a]	8
CREAMS/PASTES			
Flavo-cept (raspberry)		[a]	[g]
Profam		[a]	8
PRESSURIZED FOAM			
Emko		[a,h]	6
Patentex		[a,f]	6-8
Profam		[a]	8
SOLUBLE FILM			
C-Film	3-5, 15[i]	2[a]	[j]

NS = not stated on package label or package insert

[a] Initial dose must be repeated before each act of intercourse.

[b] "Douching after intercourse is not recommended. However, if desired, use warm water in which an Antibion tablet is dissolved."

[c] If intercourse lasts more than 30 minutes, insert a new tablet.

[d] If most of foam has leaked out or if ejaculation has occurred before tablet has dissolved, insert a new tablet.

[e] If intercourse has not taken place in one hour, insert a new suppository.

[f] May be inserted up to 30 minutes prior to intercourse.

[g] "Douching not necessary." Package insert does not state time interval required between completion of intercourse and douche.

[h] "Must be applied before physical contact but not more than one hour in advance."

[i] "Insertion of C-Film 3-5 minutes before intercourse will allow the film to dissolve. 15 minutes is probably ideal."

[j] "Douching is never recommended"

Product Effectiveness

Physiological, or method, failure is caused by shortcomings of the product itself, not of the user or provider. The physiological effectiveness of spermicides depends on two factors: (1) the potency of the active spermicidal ingredient and (2) the ability of the base, or vehicle, to spread rapidly and evenly over the cervical opening, to make the active ingredient chemically available, and to hold the spermicide in place as long as possible. The most recent effectiveness studies have focused on evaluating base materials and existing product combinations rather than active spermicidal agents alone.

Different types of spermicides vary in their ability to provide rapid and extensive coverage. Foams and creams are dispersed best, according to laboratory studies of human sexual activity (98). Suppositories need body heat to melt. Foaming tablets need moisture to produce foam, and distribution in the vagina may depend in part on coital movements. Thus, solid preparations may require as much as 15 minutes between insertion and coitus to insure melting or foaming action. (See Table 10.)

Spermicidal preparations vary both in the total amount and the concentration of active ingredient in each dose. Differences in total dose could influence effectiveness, perhaps especially so among women who produce large amounts of vaginal fluids (18). The only reported investigation of the effects of partial dosages is H. Brehm and J. Albrecht's postcoital tests of the Patentex Oval, in which application of one-half dose was effective but one-fourth dose produced less spermicidal action (29).

Since the quantity of vaginal fluid varies and since there are no standard tests to measure spermicide dispersal, studies of dispersion sometimes produce contradictory results. For example, the manufacturer of Patentex Ovals claims that the combined melting and foaming action of the product does not depend upon the amount of vaginal fluids (136). Yet, in one study foam was fully developed in all 55 users 10 minutes after insertion, whereas in another study little or no foam was generated in 9 of 20 women after 15 minutes, and the product was removed "almost intact" (183).

Furthermore, in all types of spermicides the chemical content of the base material may influence effectiveness both independently and in conjunction with the active spermicidal agent. In vitro tests of eight bases by A. Kassem and colleagues indicate that polyethylene glycol ointment allows maximum spermicidal activity for all of the active ingredients studied except phenylmercuric acetate, which performs best in a carbopol resin (99). Some bases themselves can immobilize sperm. The bases for Delfen Cream and Preceptin Gel, for example, immobilized

Table 11. Amount of Active Ingredient and Lowest Effective Concentrations for Six Vaginal Contraceptive Products in Sander-Cramer Test

Product	Active ingredient	Amount (in milligrams) of active ingredient per 100 mg	Lowest concentration of product in mg/ml capable of immobilizing sperm in 20 seconds*	Amount of active ingredient per 100 mg at lowest effective concentration (col. 3 × col. 4)
Delfen Foam	Nonoxynol-9	12.5	0.99 ± 0.0	12.4
Neo Sampoon Tablet	Menfegol	7.5	4.8 ± 0.1	36.0
Delfen Cream/Conceptrol	Nonoxynol-9	5.0	5.1 ± 0.1	25.5
Orthoforms	Nonoxynol-9	2.0	10.6 ± 0.3	21.2
Ortho-Gynol Jelly	Triton X-100	1.0	48.6 ± 1.4	48.6
Encare	Nonoxynol-9	2.3	100	230.0

Note: Tests conducted using six semen samples from the same six donors for each product
* Mean values ± standard error

Source: Hahn et al. (77)

human and rabbit sperm in one titration test, but the base for Delfen Foam did not (86).

The materials in the base may act as a physical barrier as well. In one slide test using the dissolved base for Patentex Oval without the active ingredient, the foam formed a barrier that human sperm could not penetrate (30). By contrast, commercial jelly used purely for lubrication had no effect on either sperm motility or fertility in a test with macaque monkeys (210).

Yet it is not clear from tests of different products how much the base material actually affects the potency of the final product. Sander-Cramer tests on six different products showed, for example, that a smaller amount of nonoxynol-9 was needed in Delfen Foam and Delfen Cream than in Orthoforms or Encare to achieve the same level of spermicidal effectiveness (see Table 11) (77). Preliminary results of a comprehensive series of tests by Richard Cone at the Johns Hopkins University suggested, however, that product effectiveness was directly related to the amount of active ingredient, regardless of the properties of the base (142).

The technology for examining in vitro spermicidal activity is being improved. One new testing apparatus, for example, allows simultaneous comparisons under the microscope of sperm motility in minutely different test compound concentrations (108). In vitro tests in addition to the Sander-Cramer and IPPF Agreed tests (see box, p. H-90) have been devised, the application of which depends upon the mode of action of the contraceptive. For example, a vaginal contraceptive that is supposed to promote resistance in cervical mucus to sperm transport should be tested utilizing human cervical mucus obtained at midcycle or a comparable animal cervical mucus (198).

In Vivo Testing

Because of the obvious limitations of in vitro tests, in vivo tests utilizing live animals or humans have also been devised. There are essentially two types of in vivo testing for vaginal contraceptives: postcoital examinations and fertilization tests.

In postcoital tests with animals and humans, samples of cervical mucus and vaginal fluid are examined for the presence of motile sperm at a specified time period after ejaculation. Unlike in vitro findings, postcoital test results can describe spermicidal action in the vagina. Samples of cervical mucus offer an indication of whether sperm have crossed the physical and chemical barrier created by the formulation studied. For animal tests, the rabbit (74) and the stumptailed macaque (210, 211) have been used. The most elaborate of postcoital tests in human females, conducted at the Masters and Johnson Institute in St. Louis, USA, in the 1960s, used a dildo to stimulate female sexual response, after which semen was deposited in the vagina, simulating ejaculation. These human studies are now being conducted again because of renewed interest in barrier contraception (106).

The disadvantages of postcoital tests are: (1) they are more elaborate and expensive than in vitro testing, especially when human subjects are involved and (2) their significance may be nullified by the speed and mechanisms of sperm transport.

For example, some sperm may reach the cervical canal within 90 seconds or less of ejaculation, that is, before any tests can be conducted (176); sperm may be stored and protected in the thousands of crypts along the walls of the cervix for later release; and sperm may be able to reach the ovum from the cervix even if not motile because of mechanisms in the female reproductive tract that assist in sperm transport (125). Thus, tests detecting only immotile sperm in cervical fluids may indicate that fertilization is unlikely but not that it is impossible (210).

Postcoital tests have been used to measure the effect of different intervals between the application of spermicides and coitus. West German and US tests of the Patentex Oval/Encare produced different results, however. In 44 German women having intercourse within the recommended period of 10 minutes to 2 hours after insertion of the spermicide, no motile sperm were found in the vagina, and no sperm at all at the external os in 40 cases and in the cervical canal at a depth of 1.5 to 2.0 cm in 44. In 3 cases where coitus took place *less* than 10 minutes after insertion and in 8 cases where coitus took place

Two Widely Used Spermicide Tests

In vitro tests typically involve the mixing of dispersed spermicidal products with samples of human semen in order to determine sperm-killing potency. The advantages of such tests are that they are simple to conduct, they permit direct observation of spermicidal activity, and they are inexpensive. The disadvantages are that they cannot measure a preparation's physical barrier to sperm and they cannot measure how well a spermicide is distributed in the vagina.

The two most widely used in vitro spermicide tests are the former IPPF Agreed Test for Total Spermicidal Power (95) and the Sander-Cramer test. They can be utilized to measure the effectiveness either of commercial preparations or of active spermicidal agents alone. The former IPPF Agreed Test furnishes a pass or fail verdict on a spermicide batch using a gram of spermicide diluted with 11 ml of .9 percent saline solution. One ml of this solution is mixed with 2 ml of human semen. Testing takes place in three steps. First, after 40 seconds of exposure to the spermicide solution, all sperm must be completely immobilized. Second, after 30 minutes of incubation at 35-37°C, the sperm must still reveal no signs of activity. Third, both of these results must be repeated with samples from different packages tested against the semen of two other donors (a total of three) or of five of six donors. Only then has the spermicide sample satisfied the test (95).

Such in vitro tests of spermicidal activity cannot be equated with effectiveness in actual use. Fearing that satisfying the Agreed Test would be misinterpreted as an IPPF endorsement of contraceptive effectiveness, the IPPF Central Council ordered the discontinuation of IPPF spermicide testing in November 1978 (102).

The Sander-Cramer test determines the weakest concentration of spermicide capable of immobilizing sperm within 20 seconds. In this test, .2 ml of human semen is treated with 1.0 ml of diluted spermicide. The spermicide is progressively diluted until the weakest dilution that completely immobilizes all sperm in 20 seconds is found (160).

more than 2 hours after insertion, no sperm at all were found within the cervical canal and only immotile sperm in the vagina and at the external os (28, 29, 30).

Artificial coitus tests conducted by William Masters and colleagues in the US, however, found that intervals from insertion to intercourse outside the range of 5 to 60 minutes markedly reduced the spermicidal efficacy of Encare. (They confined tests to the vagina because their 16 subjects wore cervical caps containing spermicidal jelly, primarily to protect against ascending infection.) When semen was deposited between 5 and 60 minutes after insertion of the suppository, 4 aspirations in 336 showed motile sperm in the vagina. In tests conducted with 30-second, 1-minute, and 3-minute intervals between treatment and semen deposition, however, motile sperm were visible in 83.3 percent, 52.1 percent, and 20.8 percent of the cases, respectively. The tests performed when intercourse occurred after 90 and 120 minutes showed motile sperm in 25 percent or more of cases (117). As a result of these tests Eaton-Merz Laboratories, US distributor of Encare, changed its advertised claim of effectiveness from two hours to one hour.

Animal fertilization tests use failure to impregnate as their end point rather than sperm immobilization, but fertility tests do not always agree with other measurements of effectiveness. Although postcoital tests of Delfen Cream showed complete sperm immobilization, two fertility tests with the same animals produced pregnancies in half within an average of 3.7 cycles (210). One set of tests of the contraceptive performance of Delfen Foam, Delfen Cream, and Preceptin Gel in rabbits showed a relative ranking consistent with the in vitro effectiveness of these preparations (86). In another set of tests, however, when seven commercial preparations were tested for potency both by Sander-Cramer tests using human semen and by in vivo tests of implantation rates in rabbits, rankings by relative potency did not correlate well in the two series, as shown in Table 12. The Patentex Oval, which was the least potent of the seven products in the in vitro tests, was the third most potent in the rabbit tests (87).

Laboratory studies like those described here can help researchers determine whether further investments in product development are warranted. Since no laboratory test presently used can take into account all factors that affect physiological effectiveness, however, it would be inappropriate to base the choice of a vaginal contraceptive on the results of such tests alone.

User Characteristics

While some vaginal products are probably more effective than others, some contraceptors are also more effective in using these products than others. Physiological, or method, effectiveness, is defined as the failure rate for persons who apply the method correctly. It is a more realistic indication of effectiveness in actual use than any laboratory studies. Two problems arise, however. First, users' reports of their own behavior may not be accurate, and second, there is no standard definition of correct use. Investigating whether spermicides are used correctly requires much more information than investigating whether methods such as the pill are used correctly (193). Perhaps for these reasons, method failure rates in clinical trials have varied, not only for the same type of spermicidal products, but even for the same brand of preparation (see **Population Reports**, Series H, Number 3, *Vaginal Contraceptives: A Time for Reappraisal?*, January 1975).

Table 12. Relative Potencies of Seven Spermicidal Products, as Determined by Sander-Cramer Tests and Rabbit Fertility Tests

	Sander-Cramer Test			Rabbit Fertility Test		
Product	Milligrams[a]	Relative Potency[b]	Rank	Milligrams[c]	Relative Potency[b]	Rank
Delfen Foam	1.0	1	1	2.3	1	1
Koromex II Cream	5.0	0.2	2	1,400	0.0016	5
Delfen Cream	5.0	0.2	2	390	0.0059	4
Orthoforms	5.7	0.18	3	120	0.019	2
Koromex II Jelly	20.0	0.05	4	[d]	[d]	7
Preceptin Gel	25.0	0.04	5	2,800	0.0008	6
Patentex Oval/ Encare	100.0	.01	6	149	0.015	3

[a] Minimum dosage per ml capable of immobilizing human sperm within 20 seconds

[b] Most potent assigned a value of 1

[c] Dosage capable of reducing implantation rate to half that of the control series (ED_{50})

[d] No dose-response curve for calculation of ED_{50} was generated.

Source: Homm et al. (87)

Regular use is essential to achieving high levels of use-effectiveness. Even a few omissions can lead to a large increase in failure rates: Malcolm Potts and Jack Grimshaw have estimated that 10 percent noncompliance would raise the Pearl index of failures by eight points (143).

What are the characteristics of contraceptive users—and especially of spermicide users—that seem to produce consistent use and high effectiveness? Four factors have traditionally been cited: (1) motivation, (2) education and affluence, (3) agreement between partners on contraceptive responsibility, and (4) experience in use of the method.

Motivation, or the strength of a couple's desire to avoid pregnancy, has some influence on whether any reversible contraceptive will be used effectively. US data comparing failure rates for all contraceptives among women who wanted no more births and among women who wanted only to delay the next birth showed a 50 percent lower failure rate among those who wanted no more births. Among women using various spermicidal preparations, 13.1 percent of those wanting no more births experienced failures within the first year of use compared with 16.7 percent of those wanting to delay births (199) (see Table 13).

In spite of efforts to control for motivation, there may be a bias in comparisons of the effectiveness of various methods because of self-selection. In other words, women who are most determined to avoid pregnancy will select the most effective methods and use them carefully, whereas women who are ambivalent or willing to take chances may select less effective methods and use them less rigorously, thus indirectly assuring that the methods they choose will continue to be regarded as less effective. This problem exists in all contraceptive evaluation since women cannot be randomly assigned to one or another method.

Past studies have also found that women with higher education and income are more likely to be successful users of barrier methods. US surveys in the late 1950s and early 1960s, before the pill and IUD became popular, found fewer contraceptive failures among the higher socioeconomic groups (26, 150, 203). This may still be true. The highly successful spermicide users in the study by Jack Squire and colleagues, for example, were generally in the higher social classes and well-educated (179).

A third characteristic that past studies have linked to successful contraceptive use is the quality of interaction between sex partners, usually summed up in the word "communication." Since spermicides must be used at the time of coitus, both partners have to be satisfied with the method and agree to pause in lovemaking in order to apply it. Reuben Hill and colleagues found that couples who discuss specific contraceptive methods and problems are more likely to be effective users than those who do not (83). Social class and communication between spouses are often interrelated. Lee Rainwater's US study of contraceptive performance among the urban poor showed that a lack of male cooperation and a female rejection of sexuality, more commonly found in poor couples, posed serious obstacles to effective use of barrier methods (150).

Experience in the use of spermicides also leads to more effective contraceptive performance. As decades of contraceptive effectiveness research have demonstrated, longer use provides lower failure rates (97). Long-term users adjust to the method and learn through trial and error (31). Conversely, the least successful users become

Table 13. Use-Effectiveness by Method in the USA and the United Kingdom, Failure Rates per 100 Women in First Year of Use (USA) and per 100 Woman-years (UK)

	USA Life-table failure rate in first year of use per 100 married women aged 15-44, 1970-1973			UK Pearl failure rate (per 100 woman-years) in cohort study of British married women aged 25-39
	Intention			
Method	Delay birth	Prevent birth	Standardized	
Pill	2.0	2.0	2.0	0.2[a]
IUD	5.6	2.9	4.2	1.9[b]
Condom	13.7	6.6	10.1	4.3
Diaphragm	15.9	10.3	13.1	2.4
Spermicides only	16.7	13.1	14.9	14.8[c]
Rhythm	28.8	9.5	19.1	NA

NA = not available

[a] Principally 50 μg estrogen in combined pill

[b] Lippes Loop C or D

[c] Based on 122 woman-years of use

Source: US—Vaughan et al. (199), UK—Vessey et al. (200)

pregnant early in the course of their experience with spermicides or drop the method.

Any effectiveness rate that assumes equal probability of failure in every month of exposure is subject to bias. If the period of observation is very short, the failure rate will appear misleadingly high; if the period is very long, the success of long-term users will be overrepresented. This is a major shortcoming of the Pearl Index, expressed as the number of pregnancies per 100 woman-years of use.* This distortion can be avoided by using life tables, in which failure rates are calculated for specific intervals after contraceptive use begins. Life tables can also be used to calculate extended use-effectiveness, a measure that emphasizes the importance of acceptability by counting as a method failure any unwanted pregnancy occurring after a certain method was first used, even if the method was deliberately dropped before the pregnancy occurred (199).

The Role of the Provider

Early evaluations of spermicides and other coitally related methods may have overemphasized failures on the part of the user. Blaming the victim, as one observer points out, simply diverts attention from product or program deficiencies that could be remedied with additional effort (109). While some failures may be traced to lack of motivation, others may be caused by difficulty in securing supplies, inadequate instructions in contraceptive packages, or insufficient guidance and support from family planning personnel.

Patentex Oval/Encare: Problems in Evaluating Effectiveness

The case of Patentex Ovals illustrates the difficulty of evaluating spermicides accurately. The following information is available:

- Clinical data gathered by the manufacturer from nearly 300 West German physicians showed a failure rate of less than 1 per 100 woman-years, that is, a rate comparable to that of oral contraceptives (30). These physicians and the salesmen who recruited them were compensated at a higher rate for records reporting longer usage (46). Rates are not calculated on a life table basis; if long-term users are favored, low failure rates may not represent general experience with the product.
- Calculations based on the number of German women in Netherlands abortion clinics who became pregnant using Patentex Ovals and the estimated total number of Patentex users in Germany produced a failure rate of 4 to 5 per 100 woman-years (149).
- An authoritative US survey (199) and a major British cohort study (200) both yield failure rates of about 15 per 100 women or woman-years of spermicide use, as compared with 0.2 to 2.0 for oral contraceptives. The products used did not include Patentex Ovals, however.
- Sander-Cramer tests comparing the effectiveness of seven spermicidal products in vitro, fertilization tests in rabbits, and several other laboratory and human experiments do not indicate that Patentex Ovals performed in a manner superior to other spermicides tested (77, 86, 87, 117, 183).

There are no controlled studies of Patentex Oval users compared with users of Delfen, Emko, Neo Sampoon, or similar products. Although the manufacturer of Patentex Ovals claims the product has a unique combined melting and foaming action that not only immobilizes sperm but also completely blocks the cervical opening, this has not been demonstrated in comparisons with other products.

Because of these imperfect data, *The Medical Letter*, a nonprofit US publication on drugs and therapeutics, notes,

> Since the Encare Oval, unlike some other topical contraceptives, requires manual placement high in the vagina and a 10-minute waiting period for dispersion, *Medical Letter* consultants believe that the Oval will probably fail as least as often as other similar products (2).

A similar conclusion was reached by the authors of *Contraceptive Technology, 1978-1979*, who state:

> Concern has been raised over the effectiveness rates of the newly marketed Encare Oval, a vaginal suppository which melts, then foams to release nonoxynol-9. Effectiveness rates cited by the Oval manufacturer are derived from a very unconventional study design. Careful effectiveness studies are needed. Meanwhile, the authors believe the safest approach is to consider the Oval on a par with foam for effectiveness (81).

After a disagreement between the US manufacturer and the US Food and Drug Administration (USFDA) over the first published claims of high effectiveness, Encare advertisements and labeling in the US have dropped these claims and changed the claim that the product is effective up to two hours after insertion to one hour (46, 113). Advertisements now point out that Encare answers the concerns of women who worry about the pill, cannot use the IUD, and do not want the bother of a diaphragm. Encare is "so simple, it actually encourages the regular use necessary for effectiveness," according to the promotions.

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* A Pearl Index is calculated by multiplying the number of unwanted pregnancies by 12 (or 13, to approximate the number of 28-day menstrual cycles per year), dividing the product by the total number of months in which study participants were exposed to pregnancy, and then multiplying the result by 100.

One reason for the low failure rates—less than one pregnancy per 100 woman-years—in the clinical studies of Patentex Oval and Semicid suppositories cited in Table 14 is the individual attention given each user by participating physicians (85, 149). Jack Squire, Gary Berger, and Louis Keith of the United States report only one pregnancy attributable to method failure in a group of 326 Semicid suppository users averaging 14 months of use—a failure rate of 0.3 per 100 woman-years of use; in a subgroup of 107 previously pregnant women there were no failures. The subjects were all the patients of one doctor who instructed them individually, asked each of them to insert a suppository, and then performed a vaginal examination with a speculum to make sure that the suppository was properly placed (179). A study in the Federal Republic of Germany reported a failure rate of 0.3 per 100 woman-years for over 1,600 women using Patentex Ovals. In this study, 21 gynecologists—an average of one per 79 users—provided checkups at 3-month intervals (158).

By contrast, women using Patentex Ovals who apparently rely on printed instructions experience higher pregnancy rates. For example, one 3-month study at nine abortion clinics in the Netherlands in 1978, examining Oval use by 671 German women seeking abortions, found that average duration of use at time of contraceptive failure was nine months. Based on estimates of 400,000 users of Patentex Ovals in the Federal Republic of Germany and the proportion of Patentex Oval users among German women seeking abortions at the Netherlands clinics, Levie Querido and P. Schnabel suggest a failure rate of between four and five per 100 woman-years (149). Both US survey data and the large Oxford/Family Planning Association cohort study in Great Britain indicate relatively high failure rates for users of all spermicides—about 15 pregnancies per 100 women in the first year of use in the US survey and about 15 per 100 woman-years of use in the British study (199, 200) (see Table 13). These very much higher rates may reflect differences in method effectiveness. They also undoubtedly reflect differences in the motivation, education, and experience of users. At the same time, these differences probably also reflect the difference between the majority of spermicide users, who buy these products over the counter with no personal instructions or follow-up, and the small samples of women in clinical studies who receive extensive medical attention and support.

There are at least four specific ways in which spermicide providers, whether they are family planning programs, private physicians, clinics, or manufacturers, can encourage more effective use of spermicides: (1) by providing full and accurate instructions on insertion and use that will be comprehensible to any potential user; (2) by emphasizing the need for regular use with each act of intercourse; and, especially in clinic programs, (3) by inspiring confidence in the method if it is used regularly and consistently and (4) by providing short- and long-term follow-up.

Some Possible Errors in Spermicide Use

Packaging-related
- Failure to remove the wrapping from suppositories or tablets

Insertion-related
- Inserting the spermicide into the rectum instead of the vagina
- Not inserting the spermicide high into the vagina

Timing-related
- Having intercourse before the spermicide in suppositories or tablets is dispersed
- Having intercourse too long after insertion, when the product loses effectiveness

Omissions
- Not applying before subsequent acts of intercourse
- Not applying during supposedly infertile days of the menstrual cycle

Full and accurate instructions on how to use the spermicidal product should be included in every package. As pp. HH-98–99 show, many package inserts are neither simple nor clear. Even educated women might wonder, for example, where the "posterior fornix of the vagina" or the "vulval cervix" is located. Poorly educated women would have even greater difficulty following instructions that use these terms. The anatomical illustrations used are frequently confusing and seldom give sufficient guidance for an illiterate woman. In Bangladesh, Concerned Women for Family Planning is working with the Program for the Introduction and Adaptation of Contraceptive Technology (PIACT) to devise pictorial instructions that do not require a written text (see Figure 8, p. H-118).

A difficult point to convey in pictorial instructions is that the couple must wait 2 to 10 minutes for tablets or suppositories to melt before they have sexual relations (215). Observing this time interval is necessary for full effectiveness, but it is not emphasized in most instructions and it is particularly hard to illustrate where clocks are not in common use. Errors that can be made in spermicide use are listed in the box on this page.

Health personnel who provide person-to-person instructions must be able and willing to explain the female reproductive tract and how it works, since women who are ignorant about their genital organs will almost certainly not be effective spermicide users (24).

Above all, instructors and health personnel must emphasize the need to use spermicides regularly. Furthermore, they must make clear to the user that if these instructions are followed conscientiously, then spermicides can be reliable and effective. If users do not have confidence in the spermicide, they may not make the effort required to use it correctly. The provider is usually looked upon as an authority and can give users more confidence in the method. On the other hand, a provider who expresses doubt about a method may be contributing indirectly to less successful use and helping to create a self-fulfilling prophecy of failure.

Table 14. Effectiveness of Spermicidal Contraceptives, Selected Studies, 1975-1979

Author & Date	Ref. No.	Brand	Place	Number and Characteristics of Study Population	Nature of Use Instructions	Frequency of Follow-up	Woman-months of use	Number of Pregnancies	Failure Rate[a] (pregnancies per 100 woman-years)	
									Method	Method & User
Bonhomme 1976	27	Pharmelac cream/ jelly	France	51 "sexually active women"	Instructed to insert applicator before any relations; women having "normal conjugal life" advised to apply routinely before bed	NA	521	1	2.3	2.3
Bonhomme 1976	27	Pharmelac Ovule	France	455 "sexually active women"	Instructed to insert one suppository each day before going to bed "even when relations are not foreseen"; routine application encouraged by stressing antiseptic effect of product	NA	1,547	6	2.3	4.7
Brehm & Haase 1975[b]	30	Patentex Ovals	Federal Rep. of Germany	10,017 acceptors from clinics, general practice & Pro Familia centers. 41% "white collar workers," 32% "housewives," 12% "students"; 79% aged 15-35	NA	NA	63,759	43	0.5	0.8
Salomon & Haase 1977	158	Patentex Ovals	Federal Rep. of Germany	1.652 women, 85% with contraceptive experience, 34% "housewives," 20% "commercial occupation," 10% "students"; 80% aged 15-35	"Detailed briefing on application and working mechanism"	3-month intervals	34,506	9	0.2	0.3
Flavier et al. 1979	63	Neo Sampoon loop tablets	Metro Manila, Philippines	587 from 3 clinics with highest number of tablet acceptors; 3 months of use before study start; average age of both spouses: 31.5; well-educated (⅓ with college education)	NA	Monthly	NA	33	3.8[c]	7.9
Lopez et al. 1979[d]	114	Neo Sampoon loop tablets	Bogotá, Colombia	169 "normal fertile women in union, from low socioeconomic strata" from 2 urban outpatient clinics, ≥ 2 live births, almost ½ with no previous contraceptive experience	Auxiliary nurse instruction on data recording, supplemented by instructional leaflet	1, 3, 6, and 12 months	NA	3[e]	NA	NA

Oblepias 1978	130	Neo Sampoon loop tablets	Philippines	60 selected for "intelligence, reliability, dependability"; mean age: 32.5; > 75% college graduates; mean parity: 3	Verbal instruction supplemented with printed instructions	Monthly	NA	4	NA	6.7[f]
Frankman et al. 1975	66	C-Film	Sweden	237 women attending 3 family planning clinics; no attempt was made to limit acceptors to highly motivated women; coital frequency at least once a week	Careful instruction on application to each patient; use by male recommended in early part of study but subsequently discontinued	NA	1,866	14	2	9
Grandjean et al. 1975	73	Pharmatex cream	Paris	245 private patients of 10 physicians; average age: 28.5; married average 6.8 years; 28% presented with exocervicitis, 54% with leucorrhea	Instructed to place cream in vagina "several minutes before relations"	Average 3-5 months	2,047	3	1.8	1.8
Rozenbaum 1977	157	Ta-ro-cap	France	732 private patients of 11 gynecologists, 7 general practitioners, 1 dermato-venereologist; "supposed to be fertile, of procreative age"; mean age 29 years, 61% less than 30 years; 61% of middle socioprofessional status or higher; mean coital frequency 10 per month	"Each doctor advised users systematically" on consistent, correct use	345 "regularly followed"	4,317	17	NA	4.7
Squire et al. 1979	179	Semicid	USA	326 generally "affluent, well-educated and highly motivated contraceptors," private practice patients; 11% using in conjunction with other methods	"Detailed personal instruction" from physician, with speculum examination to check proper placement	Acceptors told to return at regular intervals	NA	2	0.3[g]	NA
				Subgroup: 107 previously pregnant, using no other method			NA	0	0	0

NA = not available

[a] Figures are Pearl rates unless otherwise indicated.
[b] Results compiled from questionnaire distributed to 287 physicians in clinics, private practice, and Pro Familia centers. Manufacturer's sales personnel distributed questionnaire, and physicians were paid for completing form (2).
[c] Includes incorrect application of method
[d] Preliminary report of research in progress
[e] No pregnancies were reported at the 3-month follow-up; one each reported at 3½-, 4-, and 5-month follow-ups.
[f] Examination of records revealed unprotected coitus in all 4 cases. Form of rate calculation not given.
[g] Net cumulative rate at 24 months, calculated using life table method. Excludes months where adjunctive contraception used.

When spermicides are provided through clinics or health services, personal attention and follow-up are not necessary for medical reasons, but this additional attention does contribute to more effective use. In Gerald Bernstein's 1971 study of 2,932 Emko Foam acceptors, the majority of whom were indigent and not highly educated, special attention was given to instruction and each user was followed up at three-month intervals. Bernstein credited the resulting low failure rate of 3.98 pregnancies per 100 woman-years of use to these extra measures (22).

This situation illustrates a paradox in contraceptive use. On one hand, enhanced availability of spermicides, through community-based programs, commercial sales, and door-to-door distribution, clearly increases the acceptability and use of this method. On the other hand, to the extent that programs reach people who are less motivated, less experienced, and less exposed to the attention of sympathetic providers, these users will have higher failure rates. This is true for users of oral contraceptives as well (138). Conversely, if spermicides could only be secured on a prescription basis from clinicians who, like those cited above, are prepared to instruct patients individually, failure rates might all be in the range of 1 to 5 rather than about 15, but the number of users would be very much smaller.

Focusing on the needs of the user is more important than searching for a universally accurate failure rate. As Marianne Jackson, Gary Berger, and Louis Keith point out in their overview of the effectiveness of diaphragms, caps, and spermicides, it is misleading to cite "the" effectiveness of any method by itself. With spermicides, as with diaphragms, "any time a single rate is presented, it is a crude rate that is masking a tremendous variation in the expected failure rate for subsets of the population . . ." (97).

If generalizations must be made, an overview of earlier studies (of jellies, other products containing organometallic compounds, and the first of the surfactants) suggests that use-effectiveness rates for those products hovered around 20 failures per 100 woman-years (Pearl rate), of which physiological, or method, failures accounted for about half, or 10 failures per 100 woman-years, while user failures also amounted to 10 (97). An overview of more recent studies and surveys using products available during the 1970s suggests that the use-effectiveness of spermicides has improved, with about 15 failures per 100 woman-years (Pearl rate) (199, 200), of which method failures account for only about one-third or less—about 1 to 5 failures per 100 woman-years—while user failures now account for 10–14 failures per 100 woman-years. Depending upon the users and providers, these user failure rates can be reduced almost to zero.

Under these circumstances, it would be appropriate for health personnel and pharmacists to advise women or men who select spermicides that it is theoretically possible to achieve 95 percent protection or better by using proven spermicides regularly and correctly (97). But it would also be appropriate to warn potential users that in actual practice, failure rates are about three times as high, representing only 85 percent protection, because many users are not as careful as they need to be.

Because spermicides do have a special appeal for certain women—those who do not want to go to health centers, who are anxious about other methods, who are just beginning contraception, who have intercourse infrequently, or who need a temporary or back-up method—program administrators and health care providers should recognize the value of spermicides for these women, even if failures occur. The demographic impact of a situation where many women use imperfect methods without complete success may actually be greater than the impact of a program that provides a single, more effective method to a smaller number of acceptors. Moreover, those who wish to control their fertility should be able to make an informed choice among the different methods available.

The challenge to a family planning program in providing spermicides is to balance the benefits and shortcomings of the method with those of the available alternatives. In any program, funds, personnel, and time are always in short supply and must be utilized as efficiently as possible. Administrators must decide what resources to devote to promotion and supply of each family planning method in order to provide the best possible services. Of course, the introduction of any contraceptive method to new users requires additional instruction and effort. How much attention should be devoted to spermicides on a continuing basis will depend on the program resources available and the potential demand for spermicides in the population that the program serves. Unquestionably spermicide acceptability and effectiveness both can be improved where health care providers and other suppliers are willing to make the effort.

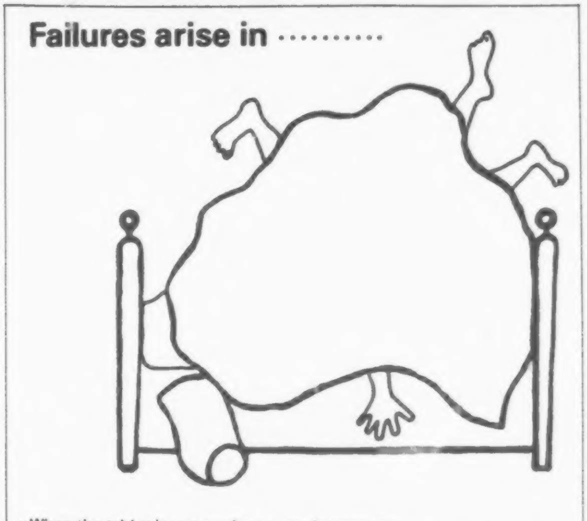
SAFETY

The safety of spermicides is one of their strongest assets. There are no reports of spermicide-related mortality nor of serious side effects. For this reason, little research has been devoted to the issue of spermicide safety as compared with the safety of systemic contraceptives, IUDs, and surgical procedures. Nonetheless, concern about the safety of all drugs is increasing. This means that, if and when new spermicides are introduced, the issue of safety will probably receive more attention.

Several considerations enter into the evaluation of spermicide safety:

- local reactions, such as tissue irritation, on the part of either partner
- systemic effects on the woman resulting from absorption through the vagina
- damage to a developing fetus from spermicide components or metabolites in the woman's circulation
- genetic damage to conceptions involving sperm damaged by spermicides.

With the exception of occasional local irritation, none of these potential problems has ever been reported. A


Failures arise in ....

- When the tablet is not used on every intercourse.
- When the tablet is not inserted deep enough or when ejaculation takes place before the tablet melts completely.
- When the intercourse is held in unusual position. It is advisable to avoid such a posture that makes the foam of the tablet flow out.

Figure 6. A Neo Sampoon brochure calls for careful use at every act of intercourse to assure maximum effectiveness. (Eisai Company)

woman using spermicides faces a greater risk of pregnancy, however, than a woman using sterilization, hormonal contraceptives, or an IUD. Since the health risks of pregnancy are usually greater than the risks of any form of contraception, this possibility is the only hazard to health that can be demonstrated after literally millions of woman-years of spermicide use.

Product Regulation

Vaginal contraceptive products have been commercially available in much of the world over a long period of time without rigorous testing for safety. In early 1972, however, the United States Food and Drug Administration (USFDA) began an ambitious program to review all drugs sold without prescription or medical supervision—about 300,000 different products. Such preparations are known as over-the-counter, or OTC, drugs to distinguish them from prescription pharmaceuticals. An extensive investigation of spermicide safety and effectiveness has been one part of this examination (113).

Chaired by Elizabeth B. Connell, the USFDA's Advisory Review Panel on OTC Contraceptives and Other Vaginal Drug Products, one of 17 OTC advisory panels, reviewed information on 30 labeled ingredients (198) in approximately 50 products, evaluating specific commonly used ingredients rather than each individual product (45). In addition to laboratory and clinical tests, the histories of products on the market for many years—and particularly the number of complaints of side effects in relation to sales volume—were taken as indications of their safety (82).

Like other panels, the contraceptive review panel classified all products in three categories:

Category I. . . . OTC contraceptives and other vaginal products . . . generally recognized as safe and effective and . . . not misbranded.

Category II. . . . OTC contraceptives and other vaginal drug products not generally recognized as safe and effective or . . . misbranded.

Category III. . . . The available data are insufficient to permit final classification at this time (198).

The surfactants nonoxynol-9, octoxynol-9, and menfegol (Neo Sampoon's TS-88) were recognized as safe and effective. Evaluation of safety was based on animal tests reviewed by the panel and the history of use over the past twenty years. Evaluation of effectiveness was based on in vitro tests. The panel's review uncovered no reports of any long-term toxic effects, nor was any evidence found to indicate ill effects on the embryo from product components or metabolites in maternal circulation, although the panel noted that this issue has not been exhaustively investigated (198). The panel's classification of spermicides is shown in Table 15.

The panel classified compounds containing mercury as "effective" but "not generally recognized as safe" (Category II). (Although phenylmercuric acetate, or PMA, was the only compound containing mercury that was submitted to the panel for formal review, related compounds which also yield mercuric ions in solution were included in the panel's tentative findings because of similar toxic properties.) In fact, there have been no reports of harmful systemic effects to users of vaginal preparations containing PMA (or any other compound), and the panel found no data regarding the effects of PMA on human embryos.

Table 15. Tentative Categorization of Selected Active Ingredients in Vaginal Contraceptives, with Considerations Cited, by the US Food and Drug Administration Advisory Review Panel on Over-the-Counter Contraceptives and Other Vaginal Drug Products, 1978

Active Ingredient	Category I: Recognition of safety, effectiveness, and no misbranding	Category II: No general recognition of safety and effectiveness, or misbranding	Category III: Insufficient data for final classification
Dodecaethylene glycol monolaurate			✓ Effectiveness
Laureth 10S			✓ Effectiveness
Menfegol	✓		
Methoxypolyoxyethyleneglycol 550 laurate			✓ Effectiveness
Nonoxynol-9	✓		
Octoxynol-9	✓		
Phenylmercuric acetate		✓ Safety	
Phenylmercuric nitrate		✓ Safety	

Source: US Food and Drug Administration (198)

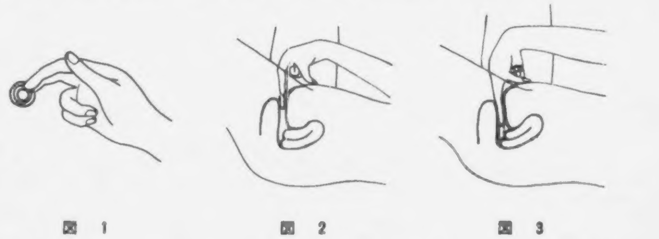
BEST AVAILAB

Spermicide Instructions:

How accurately does this diagram depict the position of the vagina?

①性行為の２～５分前に入れてください。

②まず１錠を人さし指と中指ではさんで（図１）、腟の入り口に浅く入れます（図２）。つぎに人さし指で指の先に錠剤があるようにして、腟の奥に押し込み、**指のつけ根まで静かに入れます**（図３）。



入れ方が浅いと溶けにくく、異物感がありますし、また避妊効果にも影響します。

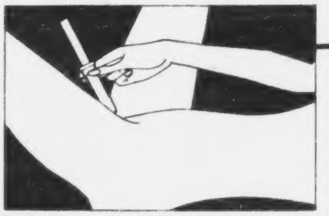
Does this drawing make clear what part of the anatomy it represents?

USE

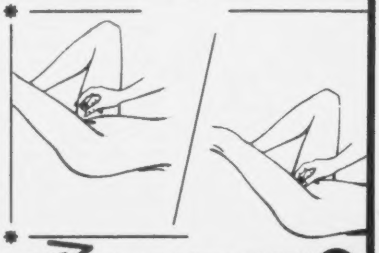
by holding contraceptor barrel as shown.
Insert deep into vagina.

PUSH

container all the way into the barrel to deposit foam. Do not insert foam more than one hour in advance of intercourse.



The text advises inserting the aplicator or tablet deeply, but do the drawings make it clear?



1o. Introduzca el Ovulo **PROFAM**[illegible] el dedo índice lo más pro[illegible] mente que pueda en la vagin

2o. Espere 10 minutos antes de la re lación sexual, para que el óvul se deshaga totalmente.No se hag ningún lavado vaginal durante la 8 horas siguientes a su aplicació

Contrary to the impression given, IPPF does not endorse products.

Testimonials:

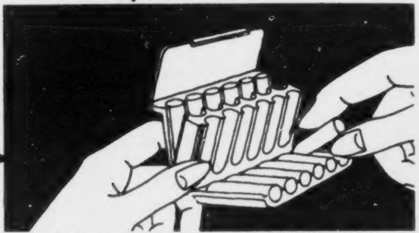
In the scientific literature and at scientific meetings ANTIBION was repeatedly recommended as a reliable contraceptive, compare for instance the meeting of the German Gynecological Society, Zbl. Gyn. vol. 55, p. 1458; Arch. Gyn. vol. 144 p. 334; Zbl. Gyn. vol. 55, p. 3647.

ANTIBION has been tested and approved by the INTERNATIONAL PLANNED PARENTHOOD FEDERATION LONDON: Test protocols dd. 4th of December, 1961, 23 rd October, 1964 and 23 rd February, 1970.

Will all women recognize this anatomical cross-section?

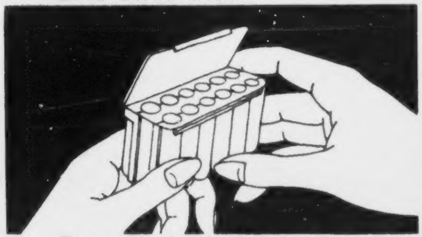
Directions:

1. To Open Case:



Lift cap and bring down one of the two banks of six chambers containing S'POSITIVE. To remove the S'POSITIVE, place your index finger at the bottom of the chamber and slide it out.

2. To Close Case:



Return the bank of chambers to its upright position. Then close the cap to protect the remaining S'POSITIVES.

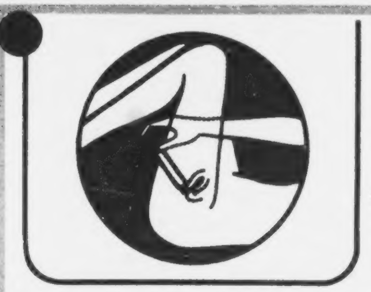
3.

ab
fo
pr

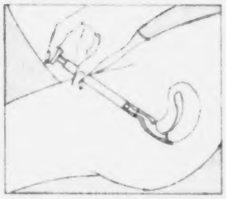
Some package inserts devote as much space to opening and closing the container as to using the product.

LE COPY

Clear or Confusing?



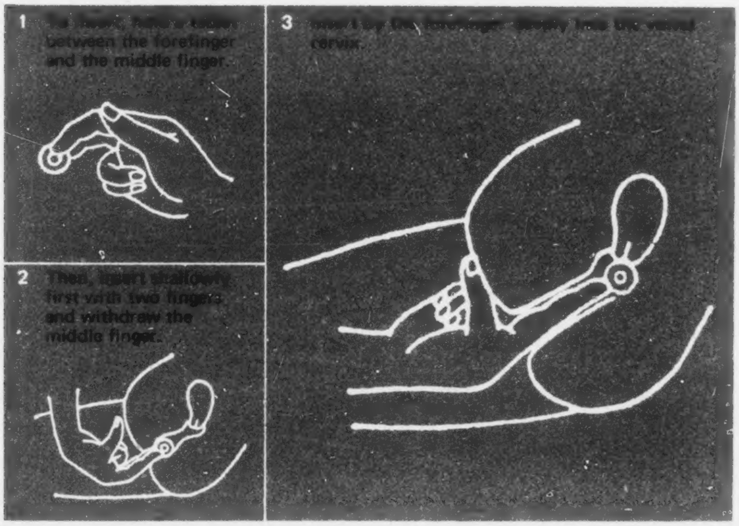
Does reluctance to picture a woman's external genitalia lead to illustrations too abstract to be clear?



(3) Insert the filled applicator well into the vagina and depress the plunger.
(4) Remove the applicator.

To clean applicator, pull plunger gently from barrel. Wash with soap and warm water. Hot water could damage the plastic.

How to use ··········



1 [illegible] between the forefinger and the middle finger.

2 Then, insert shallowly first with two fingers and withdraw the middle finger.

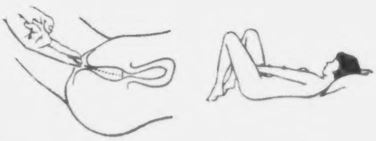
3 [illegible] cervix.

Speton also offers, in addition, protection against infections by bacteria, fungi and trichomonads.

Fields of application:
Contraception.

Dose and direction for use:
On each occasion before sexual intercourse, a **Speton** tablet is inserted as high as possible (very important!) into the vagina. The tablet disintegrates in about 5 minutes.

The label fails specifically to advise waiting five minutes.



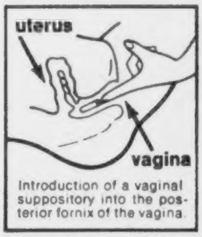
How many women know where the posterior fornix of the vagina is? The accompanying text contains a simpler explanation.

Semicid VAGINAL CONTRACEPTIVE SUPPOSITORIES

Safe... Effective... Easy to Use

DIRECTIONS FOR USE

Insert one suppository into the vagina fifteen minutes before intercourse. Use the forefinger to position suppository as deeply as possible into the vagina. Proper positioning is key to Semicid's efficacy. If intercourse is delayed more than one hour, or repeated, another suppository must be inserted. Semicid can be used safely as frequently as needed and directions should be followed each time. **SEMICID** provides a high degree of contraceptive protection. No method or product, however, can provide an absolute guarantee against becoming pregnant.



Introduction of a vaginal suppository into the posterior fornix of the vagina.

PRECAUTIONS: If douching is desired, always wait at least six hours after intercourse before douching. If you or your partner experience irritation, discontinue use. If irritation persists, consult your physician. Do not take orally.

If you have been told that it is dangerous for you to become pregnant, ask your doctor if you should use Semicid. If you miss your menstrual period, see a physician.

If tray mold container has been damaged, do not use.

KEEP OUT OF REACH OF CHILDREN

ACTIVE INGREDIENTS: Each suppository contains nonoxynol-9, 100 mg. Supplied in packages of 10.

WHITEHALL LABORATORIES INC., NEW YORK.

to Use:

NT! To insure
otection, it is
ly necessary for you to
ese instructions

Before intercourse—Using your finger, insert one S'POSITIVE suppository into the vagina, pushing it in until it will go no farther. Immediately the S'POSITIVE will start to dissolve blanketing the inner vaginal area. Intercourse should be delayed 5 to 8 minutes to allow for full dispersion. S'POSITIVE remains effective 2 hours after insertion. If intercourse is repeated, another S'POSITIVE must be inserted.

The following considerations, however, led the panel to conclude that such compounds could be hazardous to the fetus or breast-feeding infant: (1) There is evidence that PMA is absorbed through the human vagina, and animal studies show vaginal absorption, systemic circulation, and distribution of PMA in various body tissues; (2) animal studies show that PMA and its metabolite, the inorganic mercuric ion, are distributed in various fetal tissues; (3) animal studies reveal that PMA can be toxic to embryos; (4) animal studies show that PMA is excreted in milk; and (5) mercury compounds are very reactive, poisoning membranes, blocking a wide range of enzymes, and in the case of PMA harming the cells of certain tissues, especially those of the nervous system (198).

If these findings are incorporated into the USFDA's final action, ingredients in Category III will be removed from sale unless the manufacturer shows that meaningful tests are underway. Manufacturers have two years in which to comply by setting up satisfactory testing procedures or removing the ingredient from commercial sale (82).

The USFDA Advisory Panel placed three active ingredients in Category III, or "insufficient data": dodecaethylene glycol monolaurate, laureth 10S, and methoxypolyoxyethyleneglycol 550 laurate. It also formulated safety research guidelines for these substances and for any vaginal contraceptives that may appear in the future. The guidelines require much more stringent testing for new products than for spermicides that have been marketed for a number of years.

Most other countries have no specific regulations on spermicides. One exception is the United Kingdom, where spermicides were added to the coverage of the Medicines Act in 1978. Under that law, which regulates labeling and advertising, claims of high reliability are now forbidden (4). Since 1968, to manufacture spermicides legally in the United Kingdom, producers must have approval from the Committee on Safety of Medicines (68). In Denmark, all barrier methods are covered by a 1975 ordinance requiring approval from the National Health Service before they may be sold (1). Since 1975, Finland has required National Board of Health approval for marketing of all barrier methods (3).

Side Effects

Local tissue irritation, the only known side effect of spermicides, has been reported by a few users in many clinical trials over the years. Recent concerns about more serious side effects, such as systemic or metabolic effects on the user or birth defects in users' offspring, arise from theoretical concerns and the growing knowledge that other, unrelated drugs can cause such effects.

One indication of the safety of spermicides comes from a long-term prospective study of more than 17,000 British women using oral contraceptives, IUDs, or diaphragms. The diaphragm users, a fourth of the total, who are presumably using spermicidal jellies with ingredients like those in spermicides used alone, experienced no higher incidence of disease or of hospital referrals than IUD or OC users except for hemorrhoids and urinary tract infections (200). Martin Vessey notes that an excess of cystitis and closely related conditions persists among the diaphragm users even after controlling for various other factors; this condition is often attributed to the pressure of the diaphragm on the urethra but warrants further evaluation.

Local irritation can occur because the mode of action of most popular spermicides is chemical. As surfactants, or detergents, they may be irritating to the vagina or the penis in the same way that some detergents are irritating to other parts of the body. Yet, with spermicides, the problem of local sensitivity seems to arise only very rarely. For example, the suspected adverse drug effects reporting system set up by the government Committee on Safety of Medicines in the United Kingdom received reports of only four cases of local irritation between 1970 and 1973 (143).

Clinical trials typically report some complaints of discomfort and a few discontinuations due to irritation, but rates vary widely even for the same product. Only 2.6 percent of Japanese users, for example, complained of irritation with Neo Sampoon tablets (96), compared with over 75 percent of Philippine women using the same product (130).

As knowledge of female reproductive physiology has increased, scientists have noted the capacity of the vagina to absorb a wide range of substances (46, 124, 198). This raises new questions regarding the possibility of systemic effects from vaginal contraceptives. Very preliminary studies by Milos Chvapil and colleagues on a small number of animals found that intraperitoneal and intravaginal doses of nonoxynol-9 in rats appeared to change their liver chemistry. Given in an aqueous solution to rabbits, a range of intravaginal doses calculated to correspond to 100 to 1,000 mg doses to humans was transferred rapidly to the blood stream (38), but the significance of this finding is not clear. H.F. Smyth and J.C. Calandra, in a 1969 study of nonoxynol and related substances fed to dogs and rats in varying doses for extended periods, reported that no histopathologic changes indicating toxic effects were seen (175). The Program for Applied Research on Fertility Regulation (PARFR) will be undertaking two studies of possible nonoxynol-9 effects on liver function, one in women who have used spermicides containing the surfactant over a long period and the other a prospective study of women using spermicides compared with users of other methods (212).

The question still remains whether the genetic message of a sperm could be damaged by a chemical contraceptive and whether such sperm could still unite with an ovum, resulting in fetal malformation (45). Current knowledge of the way in which spermicides attack sperm suggests that this is unlikely: spermicides rupture the sperm membrane, which, it is thought, should prevent the sperm from penetrating the ovum (6, 208). It would be possible to subject sperm to various concentrations of spermicides and then test their ability to penetrate the ovum in vitro, but this type of research has not yet been attempted (6).

Effectiveness as a Safety Issue

The effectiveness of contraceptive methods should be considered in any comparison of the safety of spermicides and other methods since pregnancy always poses some danger of maternal morbidity or death. This is particularly important in parts of the world where abortion is not readily or safely available to back up less effective contraceptive methods. Using figures derived from Christopher Tietze's computer model that calculates mortality associated with pregnancy and childbirth, legal abortion, and various contraceptive methods (186, 187, 188), Judith Bruce and S. Bruce Schearer added calculations for two levels of barrier method use-effectiveness. Their results show that pregnancy and childbirth to noncontraceptors poses by far the greatest risk; the safest alternative is either highly effective use of a barrier method (defined as a failure rate of 2.5 pregnancies per 100 users per year) or less effective use (defined as 21.5 pregnancies per 100 users per year) plus legal abortion for contraceptive failures (31). In developing countries where birth-associated maternal death rates are high, pills and IUDs may in practice be safer than spermicides because their use results in lower pregnancy rates.

Nevertheless, spermicides do have a place, particularly where abortion is available, but even in some circumstances where it is not. Bruce and Schearer have identified two groups of women in developing countries, for example, for whom barrier methods would be relatively safe alternatives despite the unavailability of legal abortion. The first group is women who are spacing births: since these women want more children, they are willing to accept the health risks associated with pregnancy, and even inconsistent use of a barrier method can delay subsequent births to some of them. The second group is women who do not have access to sterilization, IUDs, or pills or prefer not to use them; for these women, even a method of low effectiveness is preferable to no method at all (31).

The relationship between contraceptive effectiveness and safety underscores the need for effectiveness studies of spermicides in developing countries. Since there will always be many women who need short-term or immediate protection from pregnancy, even if it is not 100 percent effective, the need for spermicides will persist. The more effective these spermicides are, the greater their contribution will be to improved maternal health.

PROTECTION AGAINST INFECTION

In vitro tests suggest that spermicidal contraception may offer protection against both venereal disease and certain vaginal infections, but this therapeutic effect has not been fully confirmed in actual usage.

In vitro tests have shown that spermicides inhibit growth of *Neisseria gonorrhoeae* and *Treponema pallidum*, the organisms that cause gonorrhea and syphilis, respectively. Some commercial preparations were more potent than others against gonococci—specifically Preceptin Gel,* Cooper Creme,* and Neo Sampoon tablets—as shown in Table 16 (51). These differences may be caused not only by the spermicides but also by the wetting agents used in their bases (170).

Table 16. Minimum Concentrations of Selected Spermicides Lethal to Venereal Disease Organisms

Brand	Minimum Lethal Concentration (%)* Treponema pallidum	Neisseria gonorrhoeae	Trichomonas vaginalis	Herpes simplex II
Cooper Creme	10	1	1	10
Delfen Cream	10	10	1	10
Emko Foam	10	10	1	NA
Lorophyn Suppository	10	10	1	10
Lorophyn Jelly	10	10	1	10
Ortho Gynol Jelly	10	10	1	NA
Preceptin Gel	10	1	1	5
Neo Sampoon Loop Tablet	10	1	1	NA

NA = not available

* Dilutions in weight per unit volume, prepared in physiological saline solution

Source: Cutler & Singh (50)

In the only clinical study to date, regular users of Conceptrol Creme (Delfen Cream) had fewer cases of gonorrhea than nonusers. Among 132 women over 20 years of age who had had at least one gonorrhea infection in the preceding year and were at high risk of reinfection, in the first six months of study the women using Conceptrol had an infection rate that was only 3 percent of the control group rate (51). But this difference disappeared in the next six months (see Table 17). Many women may have stopped using the cream regularly either because they were less afraid of infection (51) or because they were all using other means to prevent pregnancy. The major obstacle to effective prophylaxis, John Cutler and colleagues concluded, was inconsistent use (51).

If spermicides do prevent venereal disease, their value in family planning and health programs would be enhanced. Venereal disease is widespread in both developed and developing countries. In 1972, the most recent year for which data are available, gonorrhea ranked among the three most frequently reported communicable diseases in ten industrialized countries (205). In the United States in 1977 and 1978, over one million cases of gonorrhea were reported in the nonmilitary population (197). In West Africa, gonorrhea is second in prevalence only to malaria among communicable diseases (132).

Gonorrhea can lead to infertility. Although epidemiological data are still meager, gonorrhea is thought to be a major cause of pelvic inflammatory disease (PID) in

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* Product no longer available

Table 17. Rates of N. Gonorrhoeae Infection among Users of Conceptrol Cream and Unmedicated Controls

	First 6 Months		Second 6 Months	
	Treatment	Control	Treatment	Control
Number of women	37	50	17	27
Number of infections	1	11	4	6
Woman-months	144.4	205.1	69.3	120.2
Number of infections per 100 woman-months	0.69	5.22	5.78	4.99

Source: Cutler & Singh (50)

many parts of the developing world. PID, in turn, can produce sterility (17, 132). Nor is gonorrhea-related sterility unique to the developing world. According to one estimate, as many as 100,000 young women in the USA become sterile each year as a result of gonococcal infections (120).

Spermicides also protect against less serious but nonetheless troublesome vaginal infections. In one in vitro study all 21 vaginal contraceptive preparations tested inhibited growth of *Trichomonas vaginalis,* and six products, at least three of which contained phenylmercuric acetate, also halted the growth of *Candida albicans* organisms. These are two common causes of vaginitis (103).

Recent in vitro tests on herpes virus have produced similar results (11, 50, 141). This viricidal action may occur because surfactants such as nonoxynol-9 can break down the envelope that covers the herpes simplex virus, thus depriving it of the ability to infect (11). Even though clinical studies are lacking, anecdotal reports and observations suggest that many spermicides are effective against vaginal and possibly other reproductive tract infections (73, 157, 164, 165).

If more women realized that spermicides could protect against infection as well as against unwanted pregnancy, they might use the method more consistently and therefore more effectively. In a French study with Pharmatex suppositories, all 455 women were told about the therapeutic value of the product and instructed to use it every night whether they anticipated intercourse or not (27). Their pregnancy rate was 4.7 per 100 woman-years.

The effect of spermicides on venereal disease and other genital tract infections is a difficult field for research. A large study by Louis Keith, Gary Berger, and William Moss has found significantly lower rates of cervical gonorrhea in users of barrier methods as a group than in OC or IUD users (21, 100). The number of barrier method users, however, was too small to analyze condom, diaphragm, and foam users separately. Further research is needed to confirm these findings and to distinguish among the barrier methods.

A comparison between condoms and spermicides used alone would be particularly instructive since it would suggest the extent to which physical barriers and chemical barriers, respectively, reduce venereal disease. The research that would be easiest to design and would produce the clearest results would be unacceptable, however, since it would involve deliberately exposing users of various barrier methods and a nonusing control group to venereal disease. Cohort research like that of Cutler and colleagues encounters the problems of determining whether subjects have used the method consistently or of assuring that they do. Follow-up can also be difficult, since people with high rates of venereal disease reinfection may move frequently. Case-comparison, or retrospective, research like that of Keith and colleagues encounters the problem of determining the consistency of past use. Also, ideally, the sexual behavior of the case and comparison groups would need to be taken into account, which may be difficult to do. Still, attempts should be made to determine how effective spermicides and other barrier methods are in actual use as a prophylaxis against venereal disease and other infections. More knowledge in these areas would be extremely valuable not only to sexually active men and women but also to family planning and health program administrators.

RESEARCH AND DEVELOPMENT

Spermicide research and development currently center on improving base ingredients and devising better methods of application, for example, through vaginal rings or sponges. While better spermicidal agents are needed and there are some promising leads for research, little work has yet been done. For the developing countries, research is underway to make spermicides more durable in tropical climates and to identify spermicides that can be made from substances available in the household. Field studies financed by the US Agency for International Development to measure the acceptability of Neo Sampoon tablets are underway in 18 developing countries.

Public sector funding for research on vaginal contraception is very low, and private, commercial firms are primarily looking for simple variations on existing technology, which does not suggest any major improvements or new approaches. In fact, more stringent requirements by government agencies for safety testing may, unfortunately, discourage the introduction of new spermicides by commercial firms—especially firms that are satisfied with their present products—since entry into the US market may require as much as one million dollars to meet testing requirements (55). It is also possible that commercial firms that are satisfied with their present products and sales may use government regulations as an excuse to avoid research that would benefit the public at large but be expensive for the firms.

Product Research

Options for improving biological effectiveness of spermicides include changes in both the bases that deliver the spermicides and in the active ingredients themselves.

One goal of research on bases is to enable them to stay in place longer after application, thus assuring a longer period of effectiveness and allowing more time between application and coitus. Manufacturers conducting this research keep all results confidential since they may want to patent new products later. Reportedly, however, the longer-lasting bases now being tested with USFDA-approved spermicides are effective for 24 hours or more (147). Another experimental device utilizes agar gel as a base ingredient. Shaped like a diaphragm, it absorbs vaginal fluid and swells, releasing spermicides as well as blocking the cervix physically. Eventually—within one to eight hours—it liquefies (67).

Contraceptive film is being adapted for easier, more effective use by the male partner. Sometimes called a "water-soluble condom" or "spermicidal condom" (147), the device is more like a penile cap that does not cover the entire penile shaft. Two very fast-dissolving films have been chosen that allow rapid spermicidal action, but no in vivo testing has taken place yet (19). Earlier studies with a flat sheet of dissolving film, known as C-Film, yielded pregnancy rates ranging from 9 to 62 per 100 woman-years (66, 174).

Combining other barrier methods with spermicides to improve effectiveness deserves further exploration. Condoms lubricated with a spermicide proved highly effective for a group of British couples who had already been using condoms successfully (144). Controlled studies are needed, however, to evaluate the additional protection provided by spermicidal lubricants.

Other research centers on nondissolving delivery systems, such as the World Health Organization's spermicide-releasing vaginal rings. These devices would allow continuous protection over long periods of time with easy discontinuation by simply removing the device. Pilot clinical trials are underway in Japan, Mexico, and the United Kingdom on vaginal rings medicated with nonoxynol-9. The studies will determine ability to immobilize sperm in cervical mucus, degree of local irritation, and levels of nonoxynol-9 in cervical mucus and plasma (206). By the end of 1978 WHO funding for the project had amounted to $77,500 (US) (181). In the USA, the Proctor and Gamble Company is conducting research on rings and U-shaped controlled-release spermicidal devices (59).

The intravaginal sponge, an ancient contraceptive technique, is now being investigated as a new spermicide delivery system. Recent interest in sponges was stimulated by Milos Chvapil at the University of Arizona. In 1975, Chvapil began to study the natural protein, collagen, as a mechanical barrier method which could absorb semen rapidly, thus preventing sperm from reaching the ovum (201). Because the efficacy of the sponge alone may be low, however, it is being adapted to contain spermicide; it is thus intended to act primarily to keep spermicides in place against the cervix (38).

Polyurethane sponges whose primary action is also spermicide delivery are being developed and tested as well (185, 195). One polyurethane spermicidal sponge, the Collatex sponge, has been tested in seven countries by the International Fertility Research Program. In Yugoslavia, where 100 women have been followed for more than six months, the pregnancy rate was 1.1 per 100 women, with a continuation rate of 85.6 percent. In Egypt, Bangladesh, Colombia, and Mexico, however, only about one-half of the 179 original participants returned for follow-up; of these, nearly one-half (43 of 97) discontinued using the sponge. Discomfort during intercourse was the reason most often given. In Colombia the study was terminated because 6 of the 58 users became pregnant in 78 woman-months of use; the Bangladesh study ended because of low acceptance (72).

In contrast to the interest in new bases and delivery systems, there appears to be little research interest in developing new spermicidal agents, despite the need for them. Ideally, spermicidal action should be instantaneous (167) and effective even in very dilute solutions (169). The most potent spermicide now available is not effective

New Publications

During 1979 and 1980 the following publications on barrier methods of contraception are expected to be available:

New Developments in Vaginal Contraception, proceedings of the International Workshop on New Developments in Vaginal Contraception, held in Guatemala City, Guatemala, in April 1979. The eighth volume in the Program for Applied Research on Fertility Regulation (PARFR) Series on Fertility Regulation, the book is edited by Gerald I. Zatuchni, Aquiles Sobrero, J. Joseph Speidel, and John J. Sciarra and published by Harper and Row, Hagerstown, Maryland 21740, USA.

IPPF Handbook of Contraceptive Technology, a revised and updated version of the International Planned Parenthood Federation's comprehensive guide to family planning methods, including barrier methods. The *Handbook* can be obtained from the IPPF, 18-20 Lower Regent Street, London SW1Y 4PW, UK.

Vaginal Contraceptives, a book by Marianne Jackson, Gary S. Berger, and Louis Keith, assesses knowledge of the effectiveness of spermicides and diaphragms. The publisher is G.K. Hall and Company, 70 Lincoln Street, Boston, Massachusetts 02111, USA.

Information Services Bulletin, September 1979 issue, offers a bibliography of selected educational materials on barrier methods for users and instructors. The *Bulletin* can be obtained from the National Clearinghouse for Family Planning Information, P.O. Box 2225, Rockville, Maryland 20852, USA.

in in vitro tests beyond a dilution of 1 percent or so (77). Furthermore, a wider range of active ingredients would be useful, allowing people to try alternative preparations if they prefer spermicides but find one product or another irritating.

One promising area for research is the biochemistry of sperm. Sperm have enzyme systems that provide motility and enable them to penetrate the ovum for fertilization. The sperm acrosome, a saclike structure covering the anterior portion of the sperm head (207), contains the enzymes that enable the sperm to pass through the outer layers of the ovum. One of these enzymes, acrosin, can be inhibited by such synthetic substances as p-nitrophenyl-p′-guanidino benzoate (NPGB), which prevents conception when applied vaginally in animals (211). The main advantage of such enzyme inhibitors is that they work on a different principle from spermicides; instead of immobilizing the sperm, they prevent fusion of the sperm with the ovum. Thus, a mixture of spermicides and enzyme inhibitors may be more effective than spermicides alone. Moreover, it may be possible to develop enzyme inhibitors that are specific for spermatozoa, thus greatly lowering any chance of side effects (209).

Several other theoretical possibilities have yet to be explored. The coagulation of semen immediately after ejaculation, followed by liquefaction, is a biological mechanism with potential significance for contraception. The coagulum apparently protects the sperm inside it from vaginal acidity (125). It also shields sperm from spermicidal agents. To make spermicides more effective, it would be useful to find substances that penetrate the semen gel before it disperses, particularly if the coagulum makes direct contact with the cervix (169). An alternative would be to accomplish the reverse: to identify agents that prevent liquefaction of the semen after it has coagulated. This would trap the large number of sperm in the coagulum and prevent their passage into the cervix.

Still another opportunity for vaginal contraceptive development lies in altering cervical mucus to prevent or markedly delay sperm penetration. Although theoretically promising, such agents have yet to be developed (211). Another strategy for increasing effectiveness would be to combine active ingredients having different modes of action; for example, a spermicide could be added to a substance that alters cervical mucus plus an ingredient that prevents sperm from penetrating the ovum (208).

Substances such as iron (110, 111) and selected saponins (182) have displayed spermicidal activity and did not prove irritating in initial testing, but their development as spermicides requires further investigation.

Spermicide research for developing countries includes adapting substances to local conditions. The International Committee for Contraceptive Research has modified the Encare with tropical heat conditions in mind, to prevent melting before use. The formulation is currently undergoing studies for vaginal irritation (128).

Other research seeks to capitalize on the basic advantages of simplicity and accessibility by developing spermicides made out of household substances that can be used if no alternatives are available. This research is largely an individual effort of US researchers (5, 162, 192). In vitro testing of 50 ingredients commonly found in kitchens has narrowed the possibilities to four substances, the best proportions and consistency of which are now being determined (5).

Homemade Spermicides

The 1974 Family Planning Handbook for Doctors *offers information on household substances that can be used as spermicides by applying them to pads, plugs, or sponges when no other methods are available. (Postcoital douching with these or other solutions is ineffective, the handbook notes.)*

Remarks. [Cloth pads, plugs of cotton or silk manufacturing waste, or sponges] used with one of the spermicidal solutions mentioned below and placed high in the vagina to cover the cervix offer better protection than no method at all. They can be made more effective by being used in conjunction with one of the manufactured spermicides, i.e. creams, pastes, jellies or foam.

Spermicides

1. Vinegar and water or lemon juice and water. One part of the acid vinegar or lemon juice mixed with 20 parts of warm boiled water is an effective spermicide.

2. Oils. Any clean, sweet or cooking oil (except mustard) or fat, including butter and margarine, is suitable for smearing over the plug or sponge.

3. Soap solution. This can be prepared by dissolving a 1–1½ cm (¼–½ inch) cube of plain pure soap in a litre or quart of warm boiled water.

Strong soap (e.g. carbolic) or soap powders and detergents of all kinds must be avoided because of their injurious effect on the lining of the vagina.

Source: IPPF *Family Planning Handbook for Doctors*, 1974 (104)

Homemade spermicides were suggested in the most recent (1974) IPPF *Family Planning Handbook for Doctors* (see box, above) (104). Malcolm Potts, advocating simple, immediately available preparations like these, points out that a highly sophisticated technological approach to improving barrier methods of contraception is counter to their basic advantage of simplicity and may ignore the needs of many couples in developing countries. In India, for example, a spermicide of cottonseed and mustard oil provides "a peasant solution to a peasant problem" (142).

Research in Use and Acceptability

The acceptability of any contraceptive method is as important as its physiological effectiveness, particularly in the case of spermicides, where use must be consistent. The US Agency for International Development (USAID) is providing 15 million Neo Sampoon foaming tablets for pilot acceptability studies in 18 countries (169) and plans to substantially increase procurement and distribution of the tablets (168). Half of the tablets are for the first time being individually packaged, an innovation that should allow more variety in distribution techniques (169).

Most of the USAID pilot projects involve house-to-house distribution. In Egypt, for example, where the program covers the entire Menouffia Governate, workers provide pills, condoms, and referrals for IUD insertion and sterilization as well, but offer the tablets to lactating mothers and those frequently separated from their spouses (168). In early 1978 the International Fertility Research Program (IFRP) began field studies on the acceptability and effectiveness of Neo Sampoon tablets in 4 of the 18 countries —Bangladesh, Colombia, Egypt, and Mexico. In this study physicians at public hospital clinics and in private practice gather information on 150 acceptors in each country. Participants receive tablets free of charge. Very preliminary data from all four countries show a failure rate of about six after approximately 1,000 woman-months of exposure (168). More women in Bangladesh—32 percent —complained of heat from the tablets than in any of the three other countries (118).

Research Support

Funds for barrier method research account for only a small portion of total public sector expenditures for contraceptive research. Judith Bruce and S. Bruce Schearer of the Population Council, using data reported to the World Health Organization, estimated that in 1976, of a total of $30.2 million spent by 14 public agencies on applied contraceptive research, only $50,000 went to barrier method research; in 1977, of a total of $33.7 million, $140,000 was spent on barrier method research (31). Gerald Zatuchni of the Program for Applied Research on Fertility Regulation has estimated that, if private industry is included, expenditures for research on barrier methods might total roughly one million dollars (212). (Estimates are, of course, only rough approximations, since the dividing line between applied and basic research is sometimes arbitrary, and different subcategories of behavioral research, such as marketing studies, may be omitted by some institutions.) US government funding of research on barrier methods through the National Institute of Child Health and Human Development (NICHD) is projected at about $450,000 for Fiscal Year 1979, a figure that amounts to less than 10 percent of NICHD funds for contraceptive research (25). Even at this modest level there may not be enough high quality research proposed to merit funding (26).

Although it is not possible to state the exact extent and goals of corporate research, it appears that such efforts are not geared to producing fundamentally new technologies (31, 45). As one observer pointed out, private research and development in the United States will probably respond to the dual trends of increased consumer demand and increased product regulation largely with new products that contain already approved spermicides in commonly used bases, thus avoiding the extensive and expensive safety reviews now required for any new components (55).

Given the valuable role that spermicides can play in family planning and their present weaknesses, priority should be given to the following research and development objectives:

Product-related Improvements in Effectiveness

- spermicides that are potent even in weak concentrations (31, 169)
- bases that disperse faster in order to provide maximum chemical availability of active ingredients (31)
- bases that last longer (31, 164)
- bases that provide more adequate coverage of the cervical os (31)
- finished products that do not spoil in tropical heat and humidity, including vaginal suppositories that will remain intact until used (31, 167)
- a broader range of spermicidal agents, including ones that can affect biological mechanisms such as cervical mucus permeability or semen coagulation (204, 208)
- comparative field studies on spermicide effectiveness, including comparisons with other methods (24, 31, 43)
- combinations of methods such as spermicide-lubricated condoms.

Provider-related Improvements in Effectiveness

- improvements in the illustrations and text of printed instructions to make them complete, accurate, and easy to understand and follow (31, 164)
- evaluation of the comparative effectiveness and efficiency of printed versus face-to-face instruction
- attention to the attitudes, knowledge, and training of those who provide services, in order to eliminate biases and insure the most effective guidance and follow-up (24, 195).

Research in Health-related Issues

- safety studies related to the issue of penile and vaginal absorption of chemicals (31, 43)
- studies to identify and compare compounds that combine contraceptive action with protection against venereal disease and/or treatment of vaginitis (31, 50, 164)
- studies to compare spermicide and condoms as prophylactics against venereal diseases.

PRO FAM
PRO FAM
PRO FAM
PRO FAM
FAM

Figure 7. The acceptability of spermicides like these, specially packaged and distributed in community-based and social marketing programs, is now under study around the world.

Research and Improvements in Acceptability

- methods of application that can be used very simply in conditions of little privacy, with easy disposal of waste materials (31, 163, 204)
- improvements in containers, especially in inserters for tubed products and aerosols, for easier application (31)
- improvements in products and means of application that would enhance rather than interrupt sexual activity
- pilot tests including potential users to determine what factors influence acceptability among couples in different cultures (31, 163).

User Studies

- expanded research on beginning users of barrier methods, particularly adolescents, together with research on the health effects on adolescents of different types of contraceptive methods (31)
- studies comparing acceptance, continuation, and failure rates of users introduced to spermicides through commercial, clinic, and medical sources to identify programmatic and individual characteristics for successful use.

As many in the family planning field are beginning to recognize, it is not enough merely to criticize imperfect products or to blame careless users (24, 31, 109). A more constructive approach is to analyze systematically the problems associated with each method and to look with both knowledge and imagination for ways to overcome them. If the chemical composition of spermicides is improved through further scientific research, if packaging is modified to meet consumer needs, and if product distributors provide easier access and better guidance for potential users, spermicides can undoubtedly play a larger and more useful role in meeting the world's need for a broad range of safe, effective, and acceptable family planning methods.

TABLES

Table 1. Characteristics of Selected Spermicidal Contraceptives, by Product Type and Brand Name

Brand (Manufacturer, Country)	Size/ Weight	Active Ingredient(s)	Inert Ingredient(s)	Shelf Life	Price
FOAMING TABLETS					
Antibion (Patentex GmbH, FRG)		Nonoxynol-9, 0.024 g	Aluminum acetotartrate		
CCC (Yamanouchi Pharmaceutical Co. Ltd., Japan)	1.5 cm diameter /850 mg	Polyoxyethylene-nonyl phenyl ether, 50 mg	Potassium hydrate tartrate, 385 mg; sodium bicarbonate, 170 mg; light anhydrous silicic acid, 50 mg; hydroxypropyl starch, 103.5 mg; crystalline cellulose, 34.5 mg; synthetic aluminum silicate, 34.5 mg; hydroxy propyl cellulose, 5.5 mg; talc, 17.0 mg		
Neo Sampoon (Eisai Co., Japan)	1.5 cm diameter	p-Methanylphenyl polyoxyethylene (8.8) ether (TS-88), 60 mg	Dioctyldisodium sulfosuccinate, 5 mg; benzethonium chloride, 4 mg; starch, 111 mg; potassium bitartrate, 326 mg; sodium bicarbonate, 160 mg; silica anhydride, 30 mg; microcrystalline cellulose, 33 mg; polyvinylpyrolidone, 21 mg	At least 3 years	$1.20 (US) per dozen
Semori (Luitpold-Werk, FRG)		8-Hydroxyquinoline sulfate, 0.5%			
Speton (Temmler-Werke, FRG)	1.3 cm diameter	Disodium-4-(N-chlorsulfamoyl)-benzoate, 0.0095 g		4 years	Retail: $0.80-4.40 (US) per dozen[a]
SUPPOSITORIES & OTHER INSERTS					
A-gen 53/Syn-a-gen (Dr. Herbrand KG., FRG)		Trisodium salt of sulfuric acid ester of a polysaccharide, 0.1%[b]			
Agena (Lusofarmaco S.A., Italy)	2.5 cm × 1.3 cm /3.2 g	Nonoxynol-9, 0.250%; dodecaethylene glycol monolaurate, 0.025% benzethonium chloride, 0.125%	Polyethylene glycol, 2.675%; purified water		Retail: approx. $1.60 (US) per pack of 12

Table 1 (Continued)

Brand (Manufacturer, Country)	Size/ Weight	Active Ingredient(s)	Inert Ingredient(s)	Shelf Life	Price
Contraceptivum E (Koronis/Mapa, FRG)[c]		p-n-Nonylphenoxypolyethylene glycol, 0.024 g; sodium dioctylsulfosuccinate, 0.036 g	Lactic acid		
Encare/Patentex Oval (foaming) (Eaton-Merz Laboratories, USA)	2.8 cm × 1.4 cm/3.3 g	Nonoxynol-9, 2.27%, 0.075 g	Carbowax, sodium bicarbonate, tartaric acid	2 years; expiration date on box	Retail: (Encare) $4.25 (US) per dozen; wholesale: $2.37 (US) per dozen
Lady Suppositories (Koronis/Mapa, FRG)[c]		p-n-Nonylphenoxypolyethylene glycol, 0.024 g			
Lorophyn (Norwich International)[d]	2 g	Phenylmercuric acetate, 0.4 mg	Methylbenzethonium chloride, 0.4 g; methylparaben, 0.2 mg; in a water miscible base	At least 3 years	Retail per pack of 12: Mexico, $1.00 (US); Colombia, $1.05 (US); Peru, $.48 (US)
Norforms (Norwich International)[d]	2 g	Phenylmercuric acetate, 0.4 mg; polyethylene glycol "1000," 1.6 g	Methylbenzethonium chloride, 0.4 mg; methylparaben, 0.2 mg; sorbitan sesquioleate 0.10 g; polyoxyethylene palmitate, 0.2936 g	At least 3 years	Retail per pack of 12: Mexico, $1.00 (US); Colombia, $1.03 (US)
Orthoforms (Ortho Pharmaceutical Ltd., UK)	1.6-1.77 g	Nonoxynol-9, 5%	Polyethylene glycol		Retail: $4.00 (US) for pack of 15
Profam (Norwich Pharmacal Co. de Mexico)[e]	2.7 cm × 2.3 cm /2.268 g	Nonoxynol-9, 168 mg			
Rendells (W.J. Rendell Ltd., UK)	1.8 cm × 2 cm	Nonylphenolethylene oxide, 0.08 g	Fractionated palm kernel oil, 1.52 g	At least 7 years	
Semicid (Whitehall, USA)	2.7 cm × 0.8 cm/ 1.4 g	Nonoxynol-9, 6.6%	Carbowax (polyethylene glycols)	2 years	$3-4 (US) per dispenser of 10
Si-O-Safety Ovals (Petri GmbH KG., FRG)	2.4 cm × 1.5 cm	Quinine-hydrochloride, 0.0625 g	Boric acid, 0.0625 g		
S'positive (Jordan-Simner, USA)	2.6 cm × 0.8 cm /1.4 g	Nonoxynol-9, 5.8%	Citric acid, sodium carbonate, sodium lauryl sulfate, fragrance, excipient A5[f], excipient D[f], benzethonium chloride	2 years; expiration date on box	Suggested retail: $3.75 (US) per dozen
Staycept (Syntex Pharmaceuticals Ltd., UK)		Nonoxynol-9, 0.096 g	Methylparaben, 10.0 mg alcohol, dioctyl sodium sulphosuccinate, purified water	5 years	Retail: $1.27 (US) per 10
Ta-ro-cap (Laboratoires Human-Pharm, S.A., France)	18 mm diameter/ 0.25 g	Phenylmercuric nitrate, 2.05 mg; benzethonium chloride, 4.55 mg	Methylparaben, 10.0 mg	3 years	

Table 1 (Continued)

Brand (Manufacturer, Country)	Size/ Weight	Active Ingredient(s)	Inert Ingredient(s)	Shelf Life	Price
SOLUBLE FILM					
C-Film (Potter & Clark Ltd., UK)	5 cm^2/ 150 mg	Nonoxynol-9, 28%	Water soluble film of dried polyvinyl alcohol	5 years	
JELLIES					
Agena (Lusofarmaco S.A., Italy)		Nonoxynol-9, 5%; dodecaethylene glycol monolaurate, 5%; benzethonium chloride, 0.25%	Sodium carboxymethylcellulose, 1.8%; purified water		Retail: approx. $1.60 (US)
Confidol (Pharmasal, FRG)		Dihydrocuprein, 0.1%	Boric acid, 3%; lactic acid, 1%; tartaric acid, 0.2%; aluminum lactate, 5%; calcium lactate, 1%; glycerin, 15%; gum tragacanth, 5%		
Flavo-cept (cherry) (Nova Corp. of America, USA)		Polyethylene glycol 600 monolaurate			
Gelifax (Laboratoires Labaz, France)		Nonoxynol-9, 1%	Sodium lauryl sulfate, 1.05%; sorbic acid, 0.25%		
Koromex-2A (Holland-Rantos Co. Inc., USA)		Nonoxynol-9, 2%	Purified water, propylene glycol, boric acid, sorbitol, cellulose gum, soluble starch, simethicone	5 years	Retail: $3.05 (US), 135 g tube; $3.40 (US) 135 g tube with applicator; institutional: $8.40 (US) per dozen, 135 g tubes; $12.00 (US) per dozen, 135 g with applicator
Patentex (Patentex GmbH, FRG)		Nonoxynol-9, 1%	Aluminum acetotartrate, 1.5%		
Ramses Vaginal Contraceptive Jelly (Schmid Laboratories, USA)		Nonoxynol-9, 5%	Boric acid, 1%; ethyl alcohol, 5%		Retail: $4.38 (US) 3 oz tube with applicator; $4.38 (US), 5 oz tube; $3.60 (US), 3 oz tube
Staycept (Syntex Pharmaceuticals Ltd., UK)		Octoxynol, 1.0%	Acacia, perfume CN/A127, castor oil soap, 30%; propyl hydroxybenzoate, gum tragacanth, potassium hydroxide, boric acid, glacial acetic acid, glycerol, purified water	5 years	Retail: $1.48 (US) per 80 g tube
CREAMS/PASTES					
Conceptrol (Ortho Pharmaceutical Corp., USA)		Nonoxynol-9, 5%		3 years	Retail: $1.93 (US) per 6; $2.74 (US) per 10; institutional: $1.30 (US) per 6; $1.92 (US) per 10

Table 1 (Continued)

Brand (Manufacturer, Country)	Size/ Weight	Active Ingredient(s)	Inert Ingredient(s)	Shelf Life	Price
Delfen (Ortho, USA)		Nonoxynol-9, 5%		3 years	Retail: $3.35 (US) 70 g tube with applicator; $2.85 (US) 70 g tube only; institutional: $1.24 (US) 70 g tube with applicator; $.77 (US) 70 g tube only
Flavo-cept (raspberry) (Nova Corp. of America, USA)		Nonoxynol-9	Citric acid	3 years	$4.00 (US) per tube; wholesale $28.80 (US) per dozen
Profam (Lemery, S.A., Mexico)[e]		Nonoxynol-9, 12.5%		5 years	
PRESSURIZED FOAMS					
Delfen Foam (Ortho Pharmaceutical Corp., USA)		Nonoxynol-9, 12.5%		3 years	Retail: $2.96 (US) 20 g vial with applicator; $2.73 (US) 20 g vial; $3.64 (US) 50 g vial; institutional: $1.13 (US) 20 g vial with applicator; $.71 (US) 20 g vial; $1.09 (US) 50 g vial
Emko Foam/Emko Pre-Fil Foam/Because Contraceptor (Schering Corp., USA)		Nonoxynol-9, 8%	Benzethonium chloride, 0.2%	3 years	Institutional: $1.04 (US) 90 g can
Koromex (Holland-Rantos Co. Inc., USA)		Nonoxynol-9, 12.5%	Water, propylene glycol, propellant 114, isopropyl alcohol, Laureth-4, cetyl alcohol, propellant 12, PEG-50 stearate	5 years	Retail: $2.40 (US) 22 g vial with applicator; institutional: $13.00 (US) per dozen, 22 g vial with applicator (3 dozen/ shipping case only)
Patentex (Patentex GmbH, FRG)		Nonoxynol-9, 8%			
Profam (Lemery, S.A., Mexico)[e]		Nonoxynol-9, 12.5%			

Note: Prices of non-US products expressed in US currency are based on exchange rates of July 24, 1979.

[a] Speton—Price range for all markets worldwide

[b] Syn-a-gen (Mexico)—Also contains nonoxynol-9, 230 mg

[c] Contraceptivum E, Lady Suppositories—Source: Hoffman & Tauber (85)

[d] Lorophyn not sold in the United States, Norforms without spermicide are sold in the United States as a feminine deodorant only. Lorophyn and Norforms containing spermicide are sold throughout Central America, Argentina, Brazil, Colombia, Mexico, Peru, and Venezuela.

[e] Profam—Manufactured for Profamilia, S.A., Mexico.

[f] S'positive—Natural vegetable oils composed of a combination of mono-, di-, and triglycerides.

Table 2. Deliveries of Spermicidal Contraceptives Financed by the United States Agency for International Development, by Recipient Country, 1975-1978[a]

Country	Pressurized Foam (in 90 g containers)				Foaming Tablets (in 20-tablet containers)	Jelly/Cream (in 135 g tubes)			
	1975	1976	1977	1978	1978	1975	1976	1977	1978
AFRICA									
Benin	1,548	540	—	1,008	—	1,008	—	504	—
Botswana	96	—	—	324	—	—	—	252	181
Ethiopia	—	—	—	504	—	—	—	108	—
Egypt	—	—	216	—	25,000	612	—	550	1,008
The Gambia	504	1,008	—	—	—	—	—	—	—
Ghana	123,240	41,004	40,968	—	25,056	504	1,008	—	—
Kenya	—	—	—	1,008	—	864	1,008	—	720
Lesotho	144	1,008	—	—	—	—	1,008	—	—
Liberia	—	1,008	—	—	—	—	—	—	—
Mauritius	216	—	—	—	—	216	—	—	—
Morocco	—	—	—	—	—	—	—	—	1,008
Nigeria	1,440	1,500	—	—	—	1,008	—	—	—
Seychelles	216	300	—	—	—	216	360	—	—
Sierra Leone	2,016	—	—	—	—	2,016	—	—	—
Tanzania	—	1,200	—	6,012	—	1,224	576	2,016	2,016
Togo	—	—	—	720	—	—	—	—	468
Tunisia	2,016	—	—	—	5,000	—	—	—	—
Uganda	—	—	—	1,224	—	—	—	—	—
Zambia	—	—	—	—	—	504	—	—	—
Subtotal	131,436	47,568	40,968	10,800	55,056	8,172	3,960	3,430	5,401
ASIA & PACIFIC									
Afghanistan	—	—	15,012	—	—	25,000	10,008	20,000	—
Bangladesh	7,200	3,024	104,004	5,004	—	2,412	1,008	—	5,009
Cambodia	504	—	—	—	—	—	—	—	—
Cyprus	—	36	—	—	—	—	1,440	—	—
Iran	504	504	—	—	—	5,004	—	2,016	—
Iraq	1,008	—	—	—	—	—	7,056	—	—
Israel	—	504	—	1,008	—	—	—	—	—
Korea	—	—	—	—	20,000	—	—	—	—
Laos	—	—	—	—	—	1,008	—	—	—
Lebanon	96	—	—	504	—	216	504	—	—
Malaysia	144	144	—	—	—	756	—	108	—
Nepal	5,016	—	—	2,016	—	5,004	—	—	1,512
New Guinea	72	—	—	—	—	—	—	—	—
Pakistan	5,016	10,008	—	—	—	3,000	—	—	—
Sri Lanka	—	—	—	252	5,000	—	504	—	—
Syria	—	504	—	—	—	—	5,040	—	—
Thailand	—	—	—	—	25,040	144	—	—	—
Subtotal	19,560	14,724	119,016	8,784	100,040	42,544	25,560	22,124	6,516
LATIN AMERICA									
Argentina	—	—	—	—	—	—	—	—	2,016
Bolivia	1,008	1,692	—	—	—	—	864	—	—
Chile	5,016	—	—	9,036	—	5,004	—	—	5,004
Colombia	29,208	20,016	—	—	—	—	—	—	—
Costa Rica	5,016	5,256	—	—	—	10,008	12,024	—	35,064
Dominican Rep.	6,000	8,028	—	—	—	—	—	—	—
Ecuador	22,032	9,000	2,016	—	8,000	2,016	—	504	2,808
El Salvador	5,988	1,200	—	—	—	6,012	—	—	—
Guatemala	1,008	—	—	—	—	1,008	—	—	—
Honduras	1,200	504	2,016	504	—	—	1,008	—	—
Jamaica	12,024	1,000	6,000	—	—	19,320	—	—	—
Nicaragua	5,016	—	—	5,328	—	5,004	—	—	7,992
Panama	96	108	—	180	—	504	—	—	1,800
Paraguay	32,976	—	2,016	1,008	—	1,512	2,016	—	1,800
Surinam	1,008	—	—	—	—	1,008	—	—	—
Venezuela	9,960	—	—	—	—	9,972	—	—	—
Other[b]	8,094	72	1,512	252	—	7,524	108	1,656	—
Subtotal	125,650	46,876	13,560	16,308	8,000	68,892	16,020	2,160	56,484
TOTAL	**276,646**	**109,168**	**173,544**	**35,892**	**163,096**	**119,608**	**45,540**	**27,714**	**68,401**

[a] For earlier years, see **Population Reports,** Series H, Number 3, *Vaginal Contraceptives—A Time for Reappraisal?*, January 1975, pp. H-49-50.

[b] Other Latin America—Antigua, Aruba, Barbados, Curaçao, Dominica, Guadeloupe, Grenada, Martinique, St. Kitts, St. Lucia, St. Vincent, and Trinidad and Tobago

Source: Office of Population, US Agency for International Development (196)

Table 3. Deliveries of Spermicidal Contraceptives Financed by Family Planning International Assistance, by Year, 1972-1978

Year	Foam (average 100 gram containers)	Jelly (average 135 gram tubes)
1972	15,154	—
1973	25,105	3,569
1974	42,456	1,188
1975	53,148	720
1976	40,162	5,030
1977	41,606	5,472
1978	99,124	7,366
TOTAL	**316,755**	**23,345**

Source: R. Pomeroy, Family Planning International Assistance (140)

Table 4. Deliveries of Spermicidal Contraceptives Financed by the International Planned Parenthood Federation, by Recipient Country, 1975-1978

	Pressurized Foam (in 90 g containers)				Foaming Tablets[a] (in 20-tablet containers)			Jelly/Cream (in 135 g tubes)			
Country	**1975**	**1976**	**1977**	**1978**	**1975**	**1976**	**1977**	**1975**	**1976**	**1977**	**1978**
AFRICA											
Benin	1,008	—	1,008	1,008	500	—	2,000	1,008	—	504	1,224
Botswana	96	—	240	324	1,000	—	—	—	—	252	504
Egypt	—	—	108	—	3,000	4,000	10,000	612	—	1,008	1,008
Ethiopia	—	—	672	504	—	—	—	—	—	108	—
The Gambia	504	1,008	240	—	—	—	—	—	—	—	—
Ghana	1,200	—	8,016	4,512	50,000	90,000	210,000	1,704	1,008	3,996	10,008
Kenya	—	—	504	—	—	—	3,000	360	—	—	—
Lesotho	144	1,008	—	1,008	700	1,000	3,000	—	1,008	—	—
Liberia	—	1,008	—	—	500	2,000	2,000	—	—	—	—
Mauritius	216	—	—	—	10,000	—	—	216	—	—	—
Morocco	—	—	—	—	—	—	—	—	—	—	1,008
Nigeria	1,440	1,500	—	—	10,000	10,000	—	1,008	1,008	—	—
Seychelles	216	300	—	—	—	1,000	—	216	360	—	504
Sierra Leone	—	—	—	—	10,000	—	—	2,016	—	—	5,000
Sudan	—	—	—	—	—	—	1,000	—	—	—	—
Tanzania	2,016	1,200	2,520	6,012	2,000	1,000	3,000	1,224	576	2,016	2,016
Togo	—	—	—	504	—	—	—	—	—	—	468
Tunisia	—	—	—	—	—	—	1,000	—	—	—	—
Uganda	—	—	3,000	1,224	—	1,000	5,000	—	—	—	720
Zambia	—	—	—	—	5,000	—	2,000	504	—	—	—
Other[b]	—	600	—	972	9,500	10,000	3,000	504	—	—	—
Subtotal	6,840	6,624	15,300	16,068	108,500	120,000	272,000	9,372	3,960	7,884	22,460
ASIA & PACIFIC											
Afghanistan	—	—	—	—	500	—	—	—	—	—	—
Bangladesh	7,200	3,024	6,024	5,004	15,000	—	—	2,412	—	1,008	5,004
Cyprus	—	36	—	—	1,000	—	—	—	1,440	—	—
Hong Kong	—	—	—	—	2,000	—	7,000	—	—	—	—
Iran	504	42	—	—	—	—	1,000	5,004	5,040	2,016	—
Iraq	1,008	—	3,000	—	4,000	4,000	10,000	—	2,016	—	—
Jordan (Jerusalem)	—	42	—	1,008	—	—	—	—	—	—	—
Laos	—	—	—	—	—	—	—	1,008	—	—	—
Lebanon	96	42	—	612	500	4,000	2,000	216	504	504	—
Malaysia (Sabah)	144	552	120	—	3,000	3,500	—	756	252	—	—
Nepal	5,016	—	—	2,016	5,000	—	—	5,004	—	—	1,512
Pakistan	5,520	10,008	—	8,016	10,000	—	10,000	5,008	—	—	—
Philippines	—	—	—	—	—	200,000	200,000	—	—	—	—
Solomon Islands	—	—	—	—	—	—	1,000	—	—	—	—
Sri Lanka	—	—	—	252	—	—	—	720	504	504	—
Syria	—	—	—	—	—	—	—	—	5,040	—	—
Thailand	—	—	—	—	—	—	20,000	144	—	—	—
Yemen	—	—	—	—	—	—	3,000	—	—	—	—
Subtotal	19,488	13,746	9,144	16,908	41,000	211,500	254,000	19,056	14,796	3,528	6,516

(Continued on next page)

Table 4 (Continued)

Country	Pressurized Foam (in 90 g containers)				Foaming Tablets[a] (in 20-tablet containers)			Jelly/Cream (in 135 g tubes)			
	1975	1976	1977	1978	1975	1976	1977	1975	1976	1977	1978
LATIN AMERICA											
Argentina	—	—	—	—	—	—	—	—	—	—	2,016
Barbados	1,008	—	—	—	2,500	1,000	2,000	—	—	—	—
Bolivia	1,008	1,692	—	—	1,000	1,000	3,000	—	864	—	—
Chile	5,016	—	—	9,036	—	1,000	1,000	5,004	—	—	5,004
Colombia	19,200	20,016	—	—	100,000	70,000	139,000	—	—	—	—
Costa Rica	5,016	5,256	—	—	—	—	—	10,008	10,008	—	12,024
Dominican Rep.	6,000	8,028	—	—	30,000	40,000	20,000	—	108	—	—
Ecuador	2,016	1,008	2,016	2,016	2,000	2,000	3,000	2,016	—	2,304	3,024
El Salvador	—	—	—	—	2,000	—	—	6,012	—	—	—
Grenada	1,008	—	—	—	1,500	2,500	3,000	1,008	—	—	—
Guatemala	1,008	—	—	—	10,000	—	—	1,008	—	—	10,008
Honduras	1,200	504	2,004	504	500	1,000	2,000	—	1,008	—	—
Jamaica	—	—	—	—	—	—	1,000	—	—	—	—
Nicaragua	5,016	—	—	5,328	5,000	5,000	22,000	5,004	—	—	7,992
Panama	96	108	—	180	1,000	—	1,000	504	—	—	1,800
Paraguay	1,008	—	2,016	1,008	1,500	—	5,000	1,512	2,016	1,800	—
St. Kitts	96	—	144	216	—	1,000	2,000	—	—	144	—
St. Lucia	—	—	252	252	5,000	3,000	3,000	—	—	1,008	—
St. Vincent	612	—	—	—	500	—	1,000	612	—	—	—
Surinam	1,008	—	—	—	3,000	—	—	1,008	—	—	—
Trinidad	5,328	—	—	—	20,000	—	—	4,896	—	—	—
Uruguay	—	—	—	—	—	—	1,000	—	—	—	—
Venezuela	9,960	—	—	—	10,000	—	—	9,976	—	—	—
Other[c]	1,008	72	1,080	—	—	—	—	1,008	—	640	—
Subtotal	66,612	36,684	5,496	18,540	195,000	127,500	209,000	49,576	14,004	6,012	41,868
TOTAL	**92,940**	**47,054**	**30,940**	**51,516**	**345,000**	**459,000**	**735,000**	**78,004**	**32,760**	**17,424**	**70,844**

[a] 1978 data not available

[b] Other Africa—Nairobi Regional Office, Lome Sub Regional Office

[c] Other Latin America—Antigua, Curaçao, Montserrat, Falkland Islands

Source: Chapman, Sosler, International Planned Parenthood Federation (36, 177)

Table 5. Direct Purchases of Neo Sampoon Loop Tablets Financed by the United Nations Fund for Population Activities, by Recipient Country, 1974-1978 (in 20-tablet containers)

Country	Purchasing Organization	1974	1975[a]	1976	1977[b]	1978
Algeria	UNICEF	—	3,884	1,000	—	8,000
El Salvador	UNICEF	—	(6,075)	—	—	—
Jordan	UNICEF	—	—	—	350	350
Mauritius	UNICEF	7,000	8,400 (9,000)	13,000	9,000	15,000
Paraguay	UNICEF	—	—	1,500	—	—
Singapore	UNICEF	9,000	12,992	5,976	—	—
Sudan	WHO	—	—	—	—	1,500
Swaziland	UNICEF	—	—	—	1,500	1,000
Togo	WHO	—	—	—	—	1,800
Tonga	UNICEF	—	(200)	—	—	—
Tunisia	UNICEF	—	(200)	—	—	—
Yemen	WHO	—	—	—	—	5,000
TOTAL		**16,000**	**32,476**	**29,576**	[b]	**32,650**

UNICEF = United Nations Childrens Fund
WHO = World Health Organization

[a] Figures in parentheses indicate additional shipments from a stockpile.

[b] Figures may be incomplete due to outstanding purchase orders.

Source: D. Badham, United Nations Fund for Population Activities (12)

Table 6. Spermicidal Contraceptives Provided by the International Planned Parenthood Federation and Distributed to Acceptors, by Country, 1975-1977

Country	Pressurized Foam (in 90 g containers)			Foaming Tablets (in 20-tablet containers)			Jelly (in 135 g tubes)		
	1975	1976	1977	1975	1976	1977	1975	1976	1977
AFRICA									
Benin	237	579	192	350	700	2,000	354	609	—
Botswana	99	82[a]	63	200	927[a]	—	300	212[a]	102
Ethiopia	249	484	313[b]	35	731	242[b]	47	86	64
The Gambia	744	72	—	—	750	400	—	—	—
Ghana	3,501	5,869	5,369	48,508	83,317	157,842	3,808	2,402	5,145
Kenya	369	196	174	1,680	2,989	1,532	188	307	207
Lesotho	714	123	1,181	180	838	2,709	4	110	367
Liberia	206	—	349	282	—	934	30	—	83
Mali	—	2	52	—	—	12	—	—	12
Mauritius	61	60	—	1,333	1,526	—	34	12	—
Nigeria	192	219	582	1,503	2,293	4,884	16	134	250
Seychelles	120	—	—	—	—	—	93	—	—
Sierra Leone	510	464	714	2,403	4,230	—	88	306	503
Tanzania	528	1,990[c]	120	1,510	510[c]	2,030	840	580[c]	680
Uganda	683	29	—	—	760	1,492	—	26	61
Zambia	200	98	193	1,083	2,131	1,764	198	211	65
Subtotal	8,413	10,267	9,302	59,067	101,702	175,841	6,000	4,995	7,539
ASIA & PACIFIC									
Afghanistan	7,015	5,040	9,468	—	180	320	6,336	20,004	17,660
Bangladesh	4,210	4,359	7,766	2,280	2,606	3,985	1,699	2,545	1,211
Cyprus	—	—	35	60	—	—	109	88	121
Egypt	—	—	—	841	—	—	4,735	—	—
Hong Kong	482	459	553	3,133	4,177	3,831	2,422	3,875	4,833
India	—	—	—	1,072	2,741	1,798	785	725	748
Indonesia[d]	—	—	—	16,100	—	—	—	—	—
Iran	7	55	153	1,000	200	1,200	1,080	2,198	1,736
Iraq	445	—	—	4,000	—	1,000	—	—	—
Jordan (Jerusalem)	62	22	—	—	—	—	—	9	51
Lebanon	250	—	73	—	200	70	300	60	60
Malaysia	97	89	210	716	1,900	1,828	2,723	598	—
Morocco	—	—	—	—	—	—	1	840	152
Nepal	2,143	1,926	2,082	1,531	2,220	1,524	1,527	2,032	1,844
Pakistan	2,864	5,308	4,701	4,585	4,701	3,014	2,866	3,130	2,744
Philippines	NA	1,625	1,839	NA	1,285	2,447	NA	195	438
Malaysia (Sabah)	—	28	46	417	730	522	151	153	103
Malaysia (Sarawak)	2	105	131	202	732	942	2	41	56
Solomon Islands	—	50	20	—	—	50	—	—	1
Sri Lanka	—	—	—	—	—	—	258	336	488
Sudan	16	100	—	100	300	1,000	90	—	—
Syria	—	—	—	—	—	328	—	—	292
Thailand	1,014	8	1	13,062	2,090	1,577	1,511	8	1
Yemen	—	—	—	—	—	983	—	—	—
Subtotal	18,607	19,174	28,078	49,099	24,062	26,419	26,595	36,837	32,539
LATIN AMERICA & CARIBBEAN									
Antigua	590	184	52	—	—	—	432	—	30
Aruba	5	—	—	—	—	—	9	7	7
Barbados	241	416	1,591	371	1,561	480	691	1,024	1,011
Bolivia	20	250	278	691	1,069	—	—	—	—
Chile	5,696	2,793	51	—	545	465	5,143	5,314	1,260
Colombia	4,189	9,321	12,018	15,570	55,303	79,287	4,722	5	24
Costa Rica	2,249	10,876	4,030	18	55	—	3,951	—	—
Curaçao	44	91	199	—	—	—	78	66	103
Dominican Republic	454	35	1,905	2,303	938	3,823	24	8	64
Ecuador	701	543	2,758	1,636	3,140	2,069	1,476	1,168	1,633
El Salvador	—	772	1,067	836	2,086	1,018	—	506	995
Grenada	126	1,145	1,147	1,550	1,840	567	458	1,129	270
Guatemala	709	309	1,113	1,019	2,223	8,173	689	574	4,237
Honduras	563	828	537	923	800	—	68	—	128
Jamaica	550	395	512	765	4	863	772	701	715
Mexico	—	—	—	—	—	2,951	—	—	—
Montserrat	59	34	15	—	92	217	29	10	17

(Continued on next page)

Table 6 (Continued)

Area and Country	Pressurized Foam (in 90 g containers)			Foaming Tablets (in 20-tablet containers)			Jelly (in 135 g tubes)		
	1975	1976	1977	1975	1976	1977	1975	1976	1977
Nicaragua	964	3,370	649	2,814	5,355	1,254	180	2,248	1,500
Panama	55	18	36	173	68	252	36	26	78
Paraguay	1,224	596	—	1,980	2,228	—	1,338	598	—
St. Kitts/Nevis	66	108	48	442	158	270	25	—	5
St. Lucia	2,592	1,044	—	2,300	794	—	916	—	—
St. Vincent	225	60	51	59	—	137	65	58	62
Surinam	—	—	—	—	—	37	—	—	52
Trindad & Tobago	1,974	1,368	589	6,290	12,300	10,084	1,353	1,419	870
Uruguay	—	—	—	—	—	972	—	—	—
Subtotal	23,296	34,556	28,057	39,740	90,559	112,919	22,455	14,861	13,061
TOTAL	**50,316**	**63,997**	**65,437**	**147,906**	**216,323**	**315,179**	**55,050**	**56,693**	**53,139**

NA = not available

[a] Botswana 1976—Reported as issued to clinics

[b] Ethiopia 1977—Includes some transfer of stock to clinics

[c] Tanzania 1976—Issues to UMATI (Tanzanian Family Planning Association) clinics

[d] Indonesia—Includes some stock movement

Source: IPPF (91, 92, 93)

MANUFACTURERS OF SPERMICIDAL CONTRACEPTIVES

Name & Address	Product(s)
Dr. Herbrand KG. Chem.-Pharm. Werk D-7614 Gengenbach/Baden Fed. Rep. of Germany	A-gen 53/Syn-a-gen (s)
Eaton-Merz Laboratories, Inc. 13-27 Eaton Avenue Norwich, New York 13815 USA	Encare (s)
Eisai Company, Ltd. International Division 5-5, Koishikawa 5-chome Bunkyo-ku, Tokyo 112 Japan	Neo Sampoon (t)
Holland-Rantos Company, Inc. P.O. Box 385, 865 Centennial Avenue Piscataway, New Jersey 08854 USA attn: Medical Service Department	Koromex II Cream Koromex II Jelly Koromex II-A Jelly Koromex Foam
Jordan-Simner, Inc. 6852 N.W. 12th Avenue Fort Lauderdale, Florida 33309 USA	S'positive (s)
Koronis GmbH D5441 Sassen Fed. Rep. of Germany	Lady Suppositories Contraceptivum E (s)
Laboratoires Human-Pharm S.A. 94 rue Ed.-Vaillant 92532 Levallois-Perret France	Ta-ro-cap ("soluble [cervical] cap")
Laboratoires Labaz 39 Avenue Pierre 1er de Serbie 75008 Paris France	Gelifax (j)
Luitpold-Werk Chem.-Pharm. Fabrik Postfach 701209 8000 Munchen 70 Fed. Rep. of Germany	Semori (t)
Lusofarmaco Istituto Luso Farmaco d'Italia 20132 Milano Via Carnia 26 Italy	Agena (c) Agena (s)

Name & Address	Product(s)
Norwich International Division of Morton-Norwich Products, Inc. 410 Park Avenue New York, New York 10022 USA	
Laboratorios Eaton Vemaco Ltda. Caixa Postal 7194 ECP 01000 São Paulo Brazil	Lorophyn (s) Norforms (s)
Norwich Colombiana S.A. D.E. Transversal 42B 19-77 Apartado Aereo 13902 Bogotá Colombia	Lorophyn (s) Norforms (s)
Norwich Eaton Argentina Recuerdos de Provincia 4572 Casilla de Correo 2-Suc. 54-B Buenos Aires Argentina	Lorophyn (s) Norforms (s)
Norwich Pharmacal Company del Peru, S.A. Avenida Alfonso Ugarte No. 873 Office 803-804 Lima Peru	Lorophyn (s) Norforms (s)
Norwich Pharmacal Company de Mexico Avenida Coyoacan Num 1895 Mexico, 12 D.F.	Profam (s) Lorophyn (s) Norforms (s)
Simoniz Do Brasil Avenida Itaoca 1939 Galpao D Rio de Janeiro Brazil	Lorophyn (s) Norforms (s)
Nova Corporation of America P.O. Box 382 Cos Cob, Connecticut 06807 USA	Flavo-cept (raspberry) (c)
Ortho Pharmaceutical Corporation Raritan, New Jersey 08869 USA	Orthogynol (j) Conceptrol (c) Delfen (c) Ortho-Creme (c)

Name & Address	Product(s)
Patentex GmbH Marschnerstrasse 8-10 6 Frankfurt (Main) 1 Fed. Rep. of Germany	Patenex (f) Patentex (j) Patentex Oval (s) Antibion (t)
Petri GmbH and Company KG. Chem.-Pharm. Präparate Postfach 510320 7500 Karlsruhe 51 Fed. Rep. of Germany	Si-O-Safety (s)
Pharmasal H. Franzke KG. 3005 Hemmingen Carl-Zeiss-strasse 40 Fed. Rep. of Germany	Confidol (j)
Potter and Clarke Ltd. 415 Limpsfield Road The Green Warlingham Surrey CR3 9YS UK	C-Film
Schering Corporation Galloping Hill Road Kenilworth, New Jersey 07033 USA	Because (f) Emko (f) Emko Pre-fil (f)
Schmid Laboratories, Inc. Route 46 West Little Falls, New Jersey 07424 USA	Ramses (j)
Syntex Pharmaceuticals Limited St. Ives House St. Ives Road Maidenhead, Berkshire SL6 1RD UK	Staycept (j) Staycept (s)
Temmler-Werke Postfach 2269 D-3550 Marburg Fed. Rep. of Germany	Speton (t)
Whitehall Laboratories Inc. 685 3rd Avenue New York, New York 10017 USA	Semicid (s)
W. J. Rendell, Ltd. Ickleford Manor Hitchin Herts SG5 3XE England	Rendells (s) Genexol (s)
Yamanouchi Pharmaceutical Co., Ltd. No. 5, 2 Chome Nihonbashi, Honcho Chuo-Ku Tokyo Japan	CCC (t) CCC (j)

c = cream f = pressurized foam j = jelly s = suppository t = tablet

BIBLIOGRAPHY

1. ANONYMOUS. Denmark: control of contraceptives. International Digest of Health Legislation 28(1): 38-39. 1977.

2. ANONYMOUS. The Encare Oval. Medical Letter on Drugs and Therapeutics 20(6): 20-21. March 24, 1978.

3. ANONYMOUS. Finland: ordinance on quality control of contraceptives. International Digest of Health Legislation 27(2): 330-331. 1976.

4. ANONYMOUS. United Kingdom: the medicines (labeling and advertising to the public) regulations 1978. International Digest of Health Legislation 29(3): 622-647. 1978.

5. ALEXANDER, N. [Oregon Regional Primate Center] [Household substances as spermicides] Personal communication, June 6, 1979.

6. ALEXANDER, N. [Oregon Regional Primate Center] [Mutagenicity of spermicides for sperm] Personal communication, May 4, 1979.

7. ALI, S. [Population Services International] [PSI promotion of foaming tablets in Bangladesh] Personal communication to W. Schelstede, March 19, 1979.

8. ANDERSON, J.E., MORRIS, L., and MONTEITH, R. Contraceptive prevalence in Paraguay: major findings and results from a 1977 survey. Analytical report. Revised May 1978. Atlanta, Georgia, Center for Disease Control, 1978. 54 p.

9. ANNIS, S. Improving family planning programs in the highlands of Guatemala. Washington, D.C., American Public Health Association, 1978. (APHA Assgn. No. 1100-105) 63 p.

10. ASAYAMA, S. Adolescent sex development and adult sex behavior in Japan. Journal of Sex Research 11(2): 91-112. May 1975.

11. ASCULAI, S.S., WEIS, M.T., RANCOURT, M.W., and KUPFERBERG, A.B. Inactivation of herpes simplex viruses by nonionic surfactants. Antimicrobial Agents and Chemotherapy 13(4): 686-690. April 1978.

12. BADHAM, D. [UN Fund for Population Activities] [Procurements of spermicides with UNFPA funds] Personal communication, March 23, 1979. 8 p.

13. BAKER, L. [Whitehall Laboratories, New York] [Increased spermicide sales in the United States] Personal communication, May 18, 1979.

14. BALOG, J., LANGHAUSER, C., and RHINE, I. Recent trend in preference of contraceptive methods—pills down, diaphragm on rise: a retrospective evaluation. Contraception 15(5): 553-561. May 1977.

15. BANGLADESH. MINISTRY OF HEALTH AND POPULATION CONTROL. POPULATION CONTROL AND FAMILY PLANNING DIVISION. Bangladesh fertility survey, 1975-1976. First report. [Dacca], Bangladesh, December 1978. (World Fertility Survey) 621 p.

16. BATES, J.A., HARTMAN, A.F., O'CONNOR, R.W., QUICK, J.A., and ROUSSELLE, P.J. Procurement and use of drugs: managing the process. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 20 p. (To be published by Harper and Row)

17. BELSEY, M.A. Infertility: a universal problem. World Health, August-September 1978. p. 30-33.

18. BELSKY R. [Women's Medical Center at Kingsbrook, New York] [Amount and concentration of active ingredients in spermicides] Personal communication, June 13, 1979.

19. BELSKY, R. [Women's Medical Center at Kingsbrook, New York] [Development of C-Film] Personal communication, April 6, 1979.

20. BELSKY, R. Vaginal contraceptives: a time for reappraisal? Population Reports, Series H, No. 3. Washington, D.C., George Washington University Medical Center, Population Information Program, January 1975. 20 p.

21. BERGER, G.S., KEITH, L., and MOSS, W. Prevalence of gonorrhea among women using various methods of contraception. British Journal of Venereal Diseases 51(5): 307-309. October 1975.

22. BERNSTEIN, G.S. Clinical effectiveness of an aerosol contraceptive foam. Contraception 3(1): 37-43. January 1971.

23. BERNSTEIN, G.S. Conventional methods of contraception: condom, diaphragm, and vaginal foam. Clinical Obstetrics and Gynecology 17(1): 21-33. March 1974.

24. BERNSTEIN, G.S. and NAKAMURA, R.M. Clinical effectiveness studies. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 12 p. (To be published by Harper and Row)

25. BIALY, G. [National Institute of Child Health and Human Development] [Discussion of paper presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala] April 27, 1979.

26. BLOOD, R.O. and WOLFE, D.M. Husbands and wives: the dynamics of married living. New York, The Free Press, 1960. 293 p.

27. BONHOMME, J. La contraception chimique locale. Résultats après quatre ans d'expérimentation. [Local chemical contraception. Results after four years' experience] [FR] Semaine des hôpitaux thérapeutique 52(10): 553-555. December 1976.

28. BREHM, H. and ALBRECHT, J. Contraceptive efficacy determination by postcoital testing. Fertility and Sterility 29(2): 144-147. February 1978.

29. BREHM, H. and ALBRECHT, J. Untersuchungen zur lokalen Kontrazeption. [Studies on local contraception] [GE] Medizinische Welt 23: 865-867. June 3, 1972.

30. BREHM, H. and HAASE, W. Die Alternative zur hormonalen Kontrazeption? Bedeutung und Sicherheit eines vaginal anzuwendenden kontrazeptiven Schaumovulums. [The alternative to hormonal contraception? Importance and reliability of a foam ovoid for vaginal contraception] [GE] Medizinische Welt 26(36): 1610-1617. September 5, 1975.

31. BRUCE, J. and SCHEARER, S.B. Contraceptives and common sense: conventional methods reconsidered. New York, The Population Council, June 1979. (Public Issues series) 101 p.

32. BUSINESS INTERNATIONAL CORPORATION [BIC]. International factfinding study: private sector marketing of contraceptives in eight developing countries. 3 vols. New York, BIC, December 1978. 714 p.

33. CARPENTER, G. and MARTIN, J.B. Clinical evaluation of a vaginal contraceptive foam. In: Sobrero, A.J. and McKee, C., eds. Advances in planned parenthood. Vol. 5. (Proceedings of the 7th Annual Meeting of the American Association of Planned Parenthood Physicians, San Francisco, California, April 9-10, 1969) New York, Excerpta Medica, 1970. (International Congress Series No. 207) p. 170-175.

34. CARTWRIGHT, A. How many children? London, Routledge and Kegan Paul, 1976. 202 p.

35. CARTWRIGHT, A. Recent trends in family building and contraception. London, Her Majesty's Stationery Office, 1978. (Studies on Medical and Population Subjects No. 34) 14 p.

36. CHAPMAN, J.M. [International Planned Parenthood Federation] [IPPF shipments of Neo Sampoon loop tablets prior to 1978] Personal communication, July 16, 1979. 4 p.

37. CHULALONGKORN UNIVERSITY. INSTITUTE OF POPULATION STUDIES and NATIONAL STATISTICAL OFFICE. POPULATION SURVEY DIVISION. The survey of fertility in Thailand. Country report. Vol. 2. Bangkok, Thailand, Chulalongkorn University and National Statistical Office, 1977. (World Fertility Survey) 524 p.

38. CHVAPIL, M. [University of Arizona] [Discussion of paper presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala] April 26, 1979.

39. CHVAPIL, M., DROEGEMUELLER, W., HEINE, M.W., WEINSTEIN, L., and MILZER, G. Collagen sponge as intravaginal contraceptive barrier method: two years' experience. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 13 p. (To be published by Harper and Row)

40. CLIQUET, R.I. Evolution of the knowledge about and use of contraceptive methods among married women in the Dutch-speaking community of Belgium, 1966-1976: preliminary results of NEGO III. In: Moors, H.G. Population and family in the low countries. Vol. 2. Leiden, Netherlands, Martinus Nijhoff, 1978.

41. COLOMBIA. CORPORATION CENTRO REGIONAL DE POBLACION. DEPARTAMENTO ADMINISTRATIVO NACIONAL DE ESTADISTICA [DANE]. Encuesta nacional de fecundidad, Colombia, 1976: resultados generales. [National fertility survey, Colombia, 1976: general findings] [SP] Bogotá, Colombia, DANE, September 1976. (World Fertility Survey) 491 p.

42. CONE, R.A. [The Johns Hopkins University] [Preliminary results of effectiveness studies on spermicides] Personal communication, July 25, 1979.

43. CONNELL, E.B. Barrier methods of contraception: they can be highly effective. Studies in Family Planning 10(3): 110-111. March 1979.

44. CONNELL, E.B. A new look at barrier contraceptives. Contemporary Ob/Gyn 10(2): 76 ff. August 1977.

45. CONNELL, E.B. Vaginal contraception: current FDA status. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 26 p. (To be published by Harper and Row)

46. CONNELL, E.B., BENSON, E.M., COOKE, C.W., GORDON, M., MacCOLL, W.A., TYRER, L.B., PEARLMAN, W.H., and ROSENBAUM, V. [United States Food and Drug Administration [USFDA] Advisory Review Panel on OTC Contraceptives and Other Vaginal Drug Products] Encare Oval. [Memorandum to D. Kennedy, Commissioner, USFDA] February 9, 1978. 4 p.

47. COORDINACION DEL PROGRAMA NACIONAL DE PLANIFICACION FAMILIAR [CPNPF]. Encuesta nacional de prevalencia en el uso de metodos contraceptivos: resultados nacionales. [National survey of prevalence of the use of contraceptive methods: national findings] [SP] Mexico City, CPNPF, January 1979.

48. COSTA RICA. ASOCIACION DEMOGRAFICA COSTARRICENSE. DIRECCION GENERAL DE ESTADISTICA Y CENSOS. WESTINGHOUSE HEALTH SYSTEMS. Informe de la encuesta nacional de uso de anticonceptivos. Costa Rica 1978. [Report of the national survey on contraceptive use. Costa Rica 1978] [SP] San José, Costa Rica, Dirección General de Estadistica y Censos, November 1978. 95 p.

49. COSTA RICA. DIRECCION GENERAL DE ESTADISTICA Y CENSOS. Encuesta nacional de fecundidad, 1976, Costa Rica. [National fertility survey, 1976, Costa Rica] [SP] San José, Costa Rica, September 1978. (World Fertility Survey) 369 p.

50. CUTLER, J.C. and SINGH, B. Procon—vaginal contraceptives as prophylaxis against sexually transmissible diseases. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 12 p. (To be published by Harper and Row)

51. CUTLER, J.C., SINGH, B., CARPENTER, U., NICKENS, O., SCAROLA, A., SUSSMAN, N., WADE, M., VOLKIN, L., MARSICO, A., and BALISKY, H. Vaginal contraceptives as prophylaxis against gonorrhea and other sexually transmissible diseases. Advances in Planned Parenthood 12(1): 45-56. 1977.

52. DANART, A. [US Agency for International Development] [Profamilia promotion of Neo Sampoon] Personal communication, May 10, 1979.

53. DANART, A. [US Agency for International Development] [Use of foaming tablets in Ghana 1978] Personal communication, July 20, 1979.

54. De la MACORRA, L. Social marketing of contraceptive products. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 15 p. (To be published by Harper and Row)

55. DERMAN, R.J. An agenda for vaginal contraceptive development. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 6 p. (To be published by Harper and Row)

56. DINGLE, J.T. and TIETZE, C. Comparative study of three contraceptive methods: vaginal foam tablets, jelly alone, and diaphragm with jelly or cream. American Journal of Obstetrics and Gynecology 85(8): 1012-1021. April 15, 1963.

57. DOMINICAN REPUBLIC. CONSEJO NACIONAL DE POBLACION Y FAMILIA. Encuesta nacional de fecundidad: informe general. [National survey of fertility: general report] [SP] Santo Domingo, Dominican Republic, Secretaria de Estado de Salud Pública y Asistencia Social, October 1976. (World Fertility Survey) 611 p.

58. ECKSTEIN, P., JACKSON, M.C.N., MILLMAN, N., and SOBRERO, A.J. Comparison of vaginal tolerance tests of spermicidal preparations in rabbits and monkeys. Journal of Reproductive Fertility 20: 85-93. October 1969.

59. EDWARDS, L. P&G explores contraceptives. Advertising Age 49(43): 3, 112. October 23, 1978.

60. FABRIS, A. and DAVIS, R. Il mito del sesso. [The myth of sex] [IT] Milan, Italy, Mondadori, 1978.

61. FIJI. BUREAU OF STATISTICS. Fiji fertility survey, 1974. Principal report. Suva, Fiji, Bureau of Statistics, December 1976. (World Fertility Survey) 563 p.

62. FLASTER, T. [Schering Corporation, New York] [Increased spermicide sales in the United States] Personal communication, May 11, 1979.

63. FLAVIER, J.M., EDUARTE, R., and LOPEZ, D.F. A case study of Neo-Sampoon use-effectiveness among acceptors in selected areas in metro Manila. [1979]. 18 p. (To be published in International Journal of Gynaecology and Obstetrics)

64. FORD, K. Contraceptive efficacy among married women 15-44 years of age in the United States, 1970-73. Advancedata, No. 26, April 6, 1978. p. 1-3.

65. FORD, K. Contraceptive use in the United States, 1973-1976. Family Planning Perspectives 10(5): 264-269. September-October 1978.

66. FRANKMAN, O., RAABE, N., and INGEMANSSON, C.A. Clinical evaluation of C-Film, a vaginal contraceptive. Journal of International Medical Research 3(4): 292-296. August 1975.

67. FREUND, M. and PETERSON, R.N. Development of an intravaginal contraceptive device (ivcd) and method. [Abstract only] Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 1 p. (To be published by Harper and Row)

68. FUELL, A. [Proprietors Association of Great Britain] [Regulation of spermicides] Personal communication, July 2, 1979.

69. FURUSAWA, Y., FURUYA, K., IIDA, T., ICHIKAWA, Y., IWAKURA, T., NAKAMURA, H., HIROTA, T., and WADA, Z. Clinical study of the contraceptive effervescent tablets E-136 (Neo Sampoon loop tablets) wherein a new surface active agent p-methanylphenyl polyoxyethylene (8.8) ether (TS-88) is used. [1967]. 9 p. (Printed and distributed by Eisai Company, Ltd., Tokyo, Japan)

70. GALICH, L.F. Barrier methods. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 4 p. (To be published by Harper and Row)

71. GALVEZ, R.S. Community distribution programs and barrier methods in Guatemala. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 15 p. (To be published by Harper and Row)

72. GOLDSMITH, A., TAYLOR, R.N., Jr., BEHLILOVIC, B., STANOGLOVIC, B., and McCANN, M. Preliminary results of a multi-clinic trial of a polyurethane spermicide contraceptive sponge. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 22 p. (To be published by Harper and Row)

73. GRANDJEAN, C. Nouvel aspect de la contraception chimique locale. Etude clinique d'un sel d'ammonium quaternaire réalisée par dix médecins gynécologues et généralistes. [New aspect of local chemical contraception. Clinical study of a quaternary ammonium salt carried out by ten gynecologists and general practitioners] [FR] Archives médicales de l'ouest 7(7): 419-421. September 1975.

74. GREENSLADE, F.C., HAHN, D.W., and HOMM, R. The rabbit as an in vivo animal model for the study of vaginal contraceptive potency. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Risks, benefits, and controversies in fertility control. Hagerstown, Maryland, Harper and Row. 1978. p. 534-546.

75. GRIFFITH, A. [International Planned Parenthood Federation] [IPPF shipments of spermicides] Personal communication, May 21, 1979.

76. GYAMFI, G. [Planned Parenthood of Ghana] [Preference for foaming tablet heat in Ghana] Personal communication, July 5, 1979.

77. HAHN, D.W., HOMM, R.E., and McKENZIE, B.E. Preclinical evaluation of new vaginal contraceptives. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 25 p. (To be published by Harper and Row)

78. HALL, I.H., DREW, J.H., SAJADI, Z., and LOEFFLER, L.J. Antifertility and antiproteolytic activity of activated N-carbobenzoxy amino acid esters. Journal of Pharmaceutical Sciences 68(6): 696-698. June 1979.

79. HANSON, C. [Ghana National Family Planning Program] [Preference for foaming tablet heat in Ghana] Personal communication, July 5, 1979.

80. HARDY, N.R. and WOOD, C. Vaginal contraception. In: Potts, M. and Wood, C., eds. New concepts in contraception. Baltimore, Maryland, University Park Press, 1972. p. 103-121.

81. HATCHER, R.A., STEWART, G.K., STEWART, F., GUEST, F., STRATTEN, P., and WRIGHT, A.H. Contraceptive technology 1978-1979. 9th rev. ed. New York, Irvington Publishers, 1978. 192 p.

82. HECHT, A. Progress report: the OTC drug review. FDA Consumer 13(1): 18-22. February 1979.

83. HILL, R., STYCOS, J.M., and BLACK, K.W. The family and population control: a Puerto Rican experiment in social change. New Haven, Connecticut, College and University Press, 1959. 481 p.

84. HIMES, N. Medical history of contraception. New York, Shocken Books, 1970. 521 p.

85. HOFFMAN, K.O.K. and TAUBER, P.F. Effectiveness of vaginal foam ovula: controversies in West Germany. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 15 p. (To be published by Harper and Row)

86. HOMM, R.E., DOSCHER, G.E., HUMMEL, E.J., and GREENSLADE, R.C. Relative antifertility activity of three vaginal contraceptive products in the rabbit: relationship to in vitro data. Contraception 13(4): 479-488. April 1976.

87. HOMM, R.E., RUSTICUS, C., HAHN, D.W., and GREENSLADE, R.C. A comparison of the in vivo contraceptive potencies of a variety of marketed vaginal contraceptive dosage forms. Current Therapeutic Research 22(4): 588-595. October 1977.

88. HOWELL, C. [International Planned Parenthood Federation] [New acceptor figures for nonclinical contraceptive distribution programs] Personal communication, May 4, 1979. 1 p.

89. HUBBARD, C.W. Contraception with chemicals. In: Hubbard, C.W. Family planning education. 2nd ed. St. Louis, Missouri, C.V. Mosby, 1977. p. 75-80.

90. INDONESIA. CENTRAL BUREAU OF STATISTICS. Indonesia fertility survey. Principal report. Vol. 2. Jakarta, Indonesia, Central Bureau of Statistics, 1978. (World Fertility Survey) 278 p.

91. INTERNATIONAL PLANNED PARENTHOOD FEDERATION [IPPF]. Annual program component reporting procurement and use of contraceptives. [1976 annual report to USAID] London, IPPF, 1976. 72 p. (Unpublished)

92. INTERNATIONAL PLANNED PARENTHOOD FEDERATION [IPPF]. Annual program component reporting procurement and use of contracteptives. [1976 annual report to USAID] London, IPPF, [1977]. 67 p. (Unpublished)

93. INTERNATIONAL PLANNED PARENTHOOD FEDERATION [IPPF]. Annual program component reporting procurement and use of contraceptives. [1977 annual report to USAID] London, IPPF. 1978. 68 p. (Unpublished)

94. INTERNATIONAL PLANNED PARENTHOOD FEDERATION [IPPF]. [Spermicide deliveries] Personal communication, May, 1979. 45 p.

95. INTERNATIONAL PLANNED PARENTHOOD FEDERATION [IPPF]. EUROPE REGION. Former IPPF Agreed Test for Total Spermicidal Power (1965). London, IPPF, [1967]. 2 p. (Mimeo)

96. ISHIHAMA, A. and INOUE, T. Clinical field test of a new contraceptive vaginal foam tablet. Contraception 6(5): 401-410. November 1972.

97. JACKSON, M., BERGER, G.S., and KEITH, L. Vaginal contraceptives. Boston, G.K. Hall, [1979]. (In press)

98. JOHNSON, V.E. and MASTERS, W.H. Intravaginal contraceptive study. Phase II: physiology (a direct test for protective potential). Western Journal of Surgery, Obstetrics and Gynecology 71: 144-153. May-June 1963.

99. KASSEM, A.A., ELBARY, A.A., and NOUR, S.A. Effect of vehicles on the spermicidal potency of certain drugs. Pharmazie 32(7): 403-405. 1977.

100. KEITH, L., BERGER, G.S., and MOSS, W. Cervical gonorrhea in women using different methods of contraception. Journal of American Venereal Disease Association 3(1): 17-19. September 1976.

101. KESSLER, I.I. Perspectives on the epidemiology of cervical cancer with special reference to the herpesvirus hypothesis. Cancer Research 34(5): 1091-1110. May 1974.

102. KESTELMAN, P. IPPF testing ends. IPPF Europe Regional Information Bulletin 8(2): 11-12. April 1979.

103. KISTNER, R.W. The vagina. In: Gynecology: principles and practice. 2nd ed. Chicago, Illinois, Year Book Medical Publishers, 1971. p. 70-102.

104. KLEINMAN, R.L. Family planning handbook for doctors. London, International Planned Parenthood Federation, 1974. 173 p.

105. KLEINMAN, R.L., ed. Medical handbook. Pt. 1. Contraception. 2nd edition revised and enlarged. London, International Planned Parenthood Federation, 1964. p. 69-77.

106. KOLODNY, R. [Masters and Johnson Institute, St. Louis, Missouri] [Postcoital tests in humans] Personal communication, May 21, 1979.

107. KOREA. ECONOMIC PLANNING BOARD. NATIONAL BUREAU OF STATISTICS and THE KOREAN INSTITUTE FOR FAMILY PLANNING. The Korean national fertility survey. First country report, 1974. Seoul, Korea, National Bureau of Statistics, December 1977. (World Fertility Survey) 863 p.

108. LAUGHLIN, R.G., INNIS, J.R., and FICKEN, G.E. An improved assay for measuring the antimotility activity of chemical agents towards spermatozoa. Contraception 19(3): 315-326. March 19, 1979.

109. LINCOLN, R. [Alan Guttmacher Institute, New York] [Use of spermicides] Personal communication, July 12, 1979.

110. LOEWIT, K. Immobilization of human spermatozoa with iron: basis for a new contraceptive? Contraception 3(3): 219-224. March 1971.

111. LOEWIT, K., FODISCH, H.-J., ZAMBELIS, N., and EGG, D. Contraceptive effect of iron: local compatibility of vaginally applied iron in rats and mice. Contraception 6(1): 65-70. July 1972.

112. LOEWIT, K., ZAMBELIS, N., and EGG, D. Contraceptive effect of iron: reduced fertility after vaginal application of iron chloride in rats. Contraception 4(2): 91-96. August 1971.

113. LOHR, L. The saga of Encare Oval: an FDA advisory panel at work. American Pharmacy NS18(9): 20-24. August 1978.

114. LOPEZ, G., RIANO, G., ANZOLA, F., and BLANDON, D. Clinical trial of a contraceptive foaming tablet: a preliminary report. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 21 p. (To be published by Harper and Row)

115. MAINICHI NEWSPAPERS and POPULATION PROBLEMS RESEARCH COUNCIL. Summary of fourteenth national survey on family planning. Tokyo, Mainichi Newspapers and Population Problems Research Council. September 1978. 147 p.

116. MALAYSIA. DEPARTMENT OF STATISTICS. Malaysian fertility and family survey—1974. First country report. Kuala Lumpur, Malaysia, April 1977. (World Fertility Survey) 501 p.

117. MASTERS, W.H., KOLODNY, R.C., and JOHNSON-MASTERS, V. In vivo testing of intravaginal contraceptives. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 10 p. (To be published by Harper and Row)

118. McCANN, M. [International Fertility Research Program] [Multiclinic trials of Neo Sampoon vaginal contraceptive tablets] Personal communication, July 24, 1979.

119. McCANN, M. [International Fertility Research Program] [IFRP Neo Sampoon field trials] Personal communication, May 8, 1979.

120. McFALLS, J.A., Jr. Disease and fertility. New York, Academic Press, [1979]. (In press)

121. METZNER, R. and GOLDEN, J.S. Psychological factors influencing female patients in the selection of contraceptive devices. Fertility and Sterility 18(6): 845-855. 1967.

122. MEXICO. COORDINATION GENERAL DEL SISTEMA NACIONAL DE INFORMACION. DIRECCION GENERAL DE ESTADISTICA. SECRETARIA DE PROGRAMACION Y PRESUPUESTO. Encuesta mexicana de fertilidad. Primer informe nacional. Vol. 2. [Mexican fertility survey. First country report. Vol. 2] [SP] Mexico City, February 1979. (World Fertility Survey)

123. MIKI, T. [Eisai Pharmaceutical Co., Tokyo] [Neo Sampoon use in Japan] Personal communication, May 1975.

124. MISHELL, D., Jr. Long-acting steroid contraceptive formulations. In: Moghissi, K.S. and Evans, T.N., eds. Regulation of human fertility. (Proceedings of the 19th Harold C. Mack Symposium on the Physiology and Pathology of Reproduction, Wayne State University, Detroit, October 1973) Detroit, Michigan, Wayne State University Press, 1976. p. 85-100.

125. MOGHISSI, K.S. Sperm migration in the female reproductive tract. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 51 p. (To be published by Harper and Row)

126. MURAMATSU, M. Family planning: history, programs, and practice. In: Population Problems Research Council, Mainichi Newspaper, and the Japanese Organization for International Cooperation in Family Planning [JOICFP]. Fertility and family planning in Japan. Tokyo, JOICFP, 1977. p. 40-41.

127. NASAH, B. [University Center for Health Sciences, Yaoundé, Cameroon] [Prevalence of gonorrhea in Cameroon] Personal communication, April 18, 1979.

128. NASH, H. [Population Council] [Modification of Encare for tropical use] Personal communication, May 24, 1979.

129. NEPAL. MINISTRY OF HEALTH. FAMILY PLANNING AND MATERNAL CHILD HEALTH PROJECT. Nepal fertility survey, 1976. First report. Kathmandu, Nepal, His Majesty's Government, August 1977. (World Fertility Survey) 347 p.

130. OBLEPIAS, V.R. Clinical study on Neo Sampoon loop tablets. Manila, University of the Philippines Department of Obstetrics and Gynecology, [1978]. 18 p. (Unpublished)

131. OKUYAMA, M., UCHIDA, S., and AIHARA, R. Contraceptive effect and physical feeling with the use of surface active agent E-136 (Neo Sampoon loop tablets). [1968]. 8 p. (Printed and distributed by Eisai Company, Ltd., Tokyo, Japan)

132. OSOBA, A.O. The role of sexually transmitted diseases in infertility among Nigerians. In: Abadevoh, B.K., ed. Subfertility and infertility in Africa. Report of an International Workshop on Correlates of Sub-Fertility and Infertility in Africa, Ibadan, Nigeria, November 26-30, 1973. Ibadan, Nigeria, Caxton Press, 1974. p. 81-84.

133. PAKISTAN. POPULATION PLANNING COUNCIL. Pakistan fertility survey. First report. Islamabad, Pakistan, Population Planning Council of Pakistan, October 1976. (World Fertility Survey) 320 p.

134. PANAMA. OFICINA DE ESTUDIOS DE POBLACION. Encuesta de fecundidad. Informe general, Panama, 1977. [Fertility survey. General report, Panama, 1977] [SP] Panama, November 1977. (World Fertility Survey) 485 p.

135. PARISER, G. C-Film use-effectiveness studies. 1972/1973. Paris, USV International, 1974. (Unpublished)

136. PATENTEX GMBH. Patentex oval. Gebrauchs-information. [Patentex oval. User's information] [GE] [Product insert] Frankfurt am Main, German Federal Republic, [1979]. 2 p.

137. PEEL, J. The manufacture and retailing of contraceptives in England. Population Studies 17: 113-125. 1963.

138. PHILLIPS, J.F. Continued use of contraception among Philippine family planning acceptors: a multivariate analysis. Studies in Family Planning 9(7): 182-192. July 1978.

139. POLAND. CENTRAL STATISTICAL OFFICE. Status and perspectives of family fertility. Warsaw, Central Statistical Office, 1973.

140. POMEROY, R. [Family Planning International Assistance] [Deliveries of spermicides] Personal communication, April 26, 1979. 2 p.

141. POSTIC, B., SINGH, B., SQUEGLIA, N.L., and GUEVARRA, L.O. Inactivation of clinical isolates of herpesvirus hominis, Types 1 and 2, by chemical contraceptives. Sexually Transmitted Diseases 5(1): 22-24. January-March 1978.

142. POTTS, M. The importance of vaginal contraception. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 8 p. (To be published by Harper and Row)

143. POTTS, M. and GRIMSHAW, J.J. The usefulness and regulation of spermicides. 1974. 21 p. (Unpublished)

144. POTTS, M. and McDEVITT, J. A use-effectiveness trial of spermicidally lubricated condoms. Contraception 11(6): 701-710. June 1975.

145. PRATT, W. Overview of U.S. experience with vaginal contraceptives. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 33 p. (To be published by Harper and Row)

146. PRATT, W. [National Center for Health Statistics] [Quantity of US users of spermicides] Personal communication, May 23, 1979.

147. PROGRAM FOR APPLIED RESEARCH ON FERTILITY REGULATION. Semi-annual report. July 1, 1978-December 31, 1978. Chicago, Illinois, Northwestern University Medical School, [1979]. 94 p.

148. PROGRAMA PARA LA INTRODUCCION Y ADAPTACION DE TECNOLOGIA ANTICONCEPTIVA [PIACT] DE MEXICO A.C. Profam package materials development. Mexico City, PIACT de Mexico A.C., April 1979. 20 p.

149. QUERIDO, L. and SCHNABEL, P. Patentex oval, a new vaginal contraceptive: an evaluation of its clinical and practical effectiveness. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 16 p. (To be published by Harper and Row)

150. RAINWATER, L. And the poor get children: sex, contraception, and family planning in the working class. Chicago, Illinois, Quadrangle Books, 1960. 202 p.

151. RAINWATER, L. Family design: marital sexuality, family size, and contraception. Chicago, Illinois, Aldine, 1965. 349 p.

152. RAMSTEDT, D. Klinische und in-vivo-Erfahrungen mit einem neuen lokal anwendbaren Antikonzipiens. [Clinical and in vivo experiences with a new contraceptive for local application] [GE] Medizinische Welt 25(25): 1127-1128. June 1974.

153. RAVENHOLT, R.T. and SPEIDEL, J.J. Recent advances in technology for control of fertility. Advances in Planned Parenthood 11(3): 137-153. 1976.

154. REDMAN, J. [W.J. Rendell Ltd.] [Restrictions on spermicide marketing] Personal communication, May 22, 1979.

155. REED, J. From private vice to public virtue: the birth control movement and American society since 1830. New York, Basic Books, 1978. 456 p.

156. RODRIGUEZ, G. [World Fertility Survey] [Contraceptive use in Peru] Personal communication, June 1979.

157. ROZENBAUM, H. Expérimentation clinique TA-RO-CAP (Juil. 75/Nov. 76) [Clinical studies TA-RO-CAP (July 75/Nov. 76)] [FR] Paris, [Laboratoires Human-Pharm], 1977. 48 p.

158. SALOMON, W. and HAASE, W. Intravaginale Kontrazeption. Ergebnisse einer prospektiven Langzerstudie uber das Schaumovulum. [Intravaginal contraception. Results of a prospective long-term study of the foam ovoid] [GE] Sexualmedizin 6: 198-202. 1977.

159. SANDBERG, E.C. Psychological aspects of contraception. In: Sadock, B.J., Kaplan, H.I., and Freedman, A.M., eds. The sexual experience. Baltimore, Maryland, Williams and Wilkins, 1976. p. 335-349.

160. SANDER, F.V. and CRAMER, S.D. A practical method for testing the spermicidal action of chemical contraceptives. Human Fertility 6(5): 134-137. 1941.

161. SCHELSTEDE, W. [Population Services International] [Bangladesh spermicide acceptability] Personal communication, May 22, 1979.

162. SCRIMSHAW, S.C.M. [University of California, Los Angeles] [Spermicide acceptability] Personal communication, May 2, 1979.

163. SCRIMSHAW, S.C.M. Studies on the acceptability of vaginal contraceptives. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 21 p. (To be published by Harper and Row)

164. SEAMAN, B. Contraceptive research. [Statement, March 9, 1978.] In: United States Congress. House of Representatives. Select Committee on Population. Fertility and contraception in America: contraceptive technology and development. Vol. 3. Hearings. March 7-9, 1978. Washington, D.C., U.S. Government Printing Office, 1978. p. 457-463.

165. SEAMAN, B. and SEAMAN, G. Women and the crisis in sex hormones. In: Seaman, B. and Seaman, G. Vaginal spermicides: the contraceptive that improves vaginal health. New York, Rawson, 1977. p. 196-208.

166. SHAH, F. [The Johns Hopkins University] [Spermicide use among US adolescents] Personal communication, June 28, 1979.

167. SHELTON, J.D. [US Agency for International Development] The ideal vaginal "barrier" contraceptive. [Memorandum to R.T. Ravenholt] March 2, 1978. 2 p.

168. SHELTON, J.D. [US Agency for International Development] [Neo Sampoon loop tablet procurement and distribution] Personal communication, July 18, 1979.

169. SHELTON, J.D. [US Agency for International Development] [Requirements for effective spermicides] Personal communication, April 12, 1979.

170. SINGH, B. [University of Pittsburgh] [Spermicides as STD prophylaxis] Personal communication, May 14, 1979.

171. SINGH, B. and CUTLER, J.C. Vaginal contraceptives for prophylaxis against sexually transmissible diseases. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 16 p. (To be published by Harper and Row)

172. SINGH, B., CUTLER, J.C., and UTIDJIAN, H.M.D. Studies on the development of a vaginal preparation providing both prophylaxis against veneral disease, other genital infections and contraception. II: In vitro effect of vaginal contraceptive and selected vaginal preparations on *Candida albicans* and *Trichomonas vaginalis*. Contraception 5(5): 401-411. May 1972.

173. SINGH, B., POSTIC, B., and CUTLER, J.C. Virucidal effect of certain chemical contraceptives on Type 2 herpesvirus. American Journal of Obstetrics and Gynecology 126(4): 422-425. October 15, 1976.

174. SMITH, M., VESSEY, M.P., BOUNDS, W., and WARREN, J. C-Film as a contraceptive. [Letter] British Medical Journal 4(5939): 291. November 2, 1974.

175. SMYTH, H., Jr. and CALANDRA, J. Toxicologic studies of alkylphenol polyoxyethylene surfactants. Toxicology and Applied Pharmacology 14(2): 315-334. March 1969.

176. SOBRERO, A.J. and MACLEOD, J. The immediate postcoital test. Fertility and Sterility 13(2): 184-189. April 1962.

177. SOSLER, S. [International Planned Parenthood Federation] [Non-GSA orders for spermicides] Personal communication, May 14, 1979. 4 p.

178. SPEIDEL, J.J., KESSEL, E., BERGER, G.S., and LABBOK, M. Recent developments in technology for the control of female fertility. In: Wynn, R.M., ed. Obstetrics and gynecology annual. Vol. 7, 1978. New York, Appleton-Century-Crofts, 1978. p. 397-445.

179. SQUIRE, J.J., BERGER, G.S., and KEITH, L. A retrospective clinical study of a vaginal contraceptive suppository. [1979]. (To be published in Journal of Reproductive Medicine)

180. SRI LANKA. MINISTRY OF PLAN IMPLEMENTATION. DEPARTMENT OF CENSUS AND STATISTICS. World fertility survey, Sri Lanka, 1975. First report. Colombo, Sri Lanka, Department of Census and Statistics, March 1978. (World Fertility Survey) 713 p.

181. STANDLEY, C.C. [World Health Organization] [Funding for spermicidal ring research] Personal communication, May 15, 1979. 2 p.

182. STOLZENBERG, S.J. and PARKHURST, R.M. Spermicidal actions of extracts and compounds from *Phytolacca dodecandra*. Contraception 10(2): 135-143. August 1974.

183. STONE, S.S. and CARDINALE, F. Evaluation of a new vaginal contraceptive. American Journal of Obstetrics and Gynecology 133(6): 635-638. March 15, 1979.

184. SUKKARY, S. Acceptability of indigenous fertility regulating methods in two Egyptian villages: Mit-Rahina and Sakara (preliminary report prepared for WHO). [1977]. 40 p. (Unpublished)

185. TIETZE, C. The clinical effectiveness of contraception. In: [Procedings of] The Third International Conference on Planned Parenthood, November 24-29, 1952, Bombay, India. Bombay, Family Planning Association of India, [1953]. p. 108-113.

186. TIETZE, C. New estimates of mortality associated with fertility control. Family Planning Perspectives 9(2): 74-76. March-April 1977.

187. TIETZE, C., BONGAARTS, J., and SCHEARER, S.B., Mortality associated with the control of fertility. Family Planning Perspectives 8(1): 6-14. January-February 1976.

188. TIETZE, C. and LEWIT, S. Life risks associated with reversible methods of fertility regulation. International Journal of Gynaecology and Obstetrics 16(6): 456-465. May-June 1979.

189. TIETZE, C., PAI, D.N., TAYLOR, C.E., and GAMBLE, C.J. A family planning service in rural Puerto Rico. American Journal of Obstetrics and Gynecology 81: 174-182. January 1961.

190. TOLOFI, P. [Lesotho Family Planning Association] [Foaming tablet acceptability in Lesotho] Personal communication, July 5, 1979.

191. TORRES, A. Organized family planning services in the United States, 1968-1976. Family Planning Perspectives 10(2): 83-88. March-April 1978.

192. TRAPANI, F. [Research on household spermicides] Personal communication, May 21, 1979.

193. TRUSSELL, T.J., FADEN, R., and HATCHER, R.A. Efficacy information in contraceptive counseling: those little white lies. American Journal of Public Health 66(8): 761-767. August 1976.

194. TYRER, L.B. and BRADSHAW, L.E. Barrier methods. [Draft copy] June 7, 1978. (Unpublished) 18 p.

195. TYRER, L.B. and BRADSHAW, L.E. Jost intravaginal device: a spermicidal sponge. Presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 9 p. (To be published by Harper and Row)

196. UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT [USAID]. OFFICE OF POPULATION. [Spermicide deliveries] Personal communication, May 15, 1979. 5 p.

197. UNITED STATES DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE [USDHEW]. PUBLIC HEALTH SERVICE. CENTER FOR DISEASE CONTROL. VENEREAL DISEASE CONTROL DIVISION. STD fact sheet. Edition thirty-four: basic statistics on the sexually transmitted disease problem in the United States. Atlanta, Georgia, USDHEW, 1979. (CDC 79-8195) 37 p.

198. UNITED STATES FOOD AND DRUG AMINISTRATION [USFDA] ADVISORY REVIEW PANEL ON OTC CONTRACEPTIVES AND OTHER VAGINAL DRUG PRODUCTS. OTC contraceptives and other vaginal products. (Information copy) Rockville, Maryland, USFDA, November 1978. 6 p.

199. VAUGHAN, B., TRUSSELL, J., MENKEN, J., and JONES, E.F. Contraceptive failure among married women in the United States, 1970-1973. Family Planning Perspectives 9(6): 251-258. November-December 1977.

200. VESSEY, M., DOLL, R., PETO, R., JOHNSON, B., and WIGGINS, P. A long-term follow-up of women using different methods of contraception—an interim report. Journal of Biosocial Science 8(4): 373-427. October 1976.

201. VORHAUER LABORATORIES. Intravaginal collagen sponge contraceptive device: status. December 1976. Newport Beach, California, Vorhauer Laboratories. 1976. 2 p.

202. WESTOFF, C.F. Coital frequency and contraception. Family Planning Perspectives 6(3): 136-141. Summer 1974.

203. WHELPTON, P.K., CAMPBELL, A.A., and PATTERSON, J.E. Fertility and family planning in the United States. Princeton, New Jersey, Princeton University Press, 1966. 443 p.

204. WILLIFORD, J.F. Barrier methods of contraception: problems and prospects for the developing world. Draper Fund Report, No. 6, Summer 1978. p. 9-13.

205. WORLD HEALTH ORGANIZATION [WHO]. Fifth report on the world health situation. Geneva, WHO, 1975. (Official Records of the WHO 225) p. 86, 159-235, 275, 278.

206. WORLD HEALTH ORGANIZATION [WHO]. Special program of research, development, and research training in human reproduction. Seventh annual report. Geneva, WHO, November 1978. p. 75-83, 109-115.

207. ZANEVELD, L.J.D. The biology of human spermatozoa. In: Wynn, R.M., ed. Obstetrics and gynecology annual. Vol. 7, 1978. New York, Appleton-Century-Crofts, 1978. p. 17-40.

208. ZANEVELD, L.J.D. [University of Illinois] [Multiple active ingredients in spermicides; mutagenicity of spermicides for sperm] Personal communication, May 16, 1979.

209. ZANEVELD, L.J.D. Sperm enzyme inhibitors as antifertility agents. In: Hafer, E.S., ed. Human semen and fertility regulation in the male. St. Louis, Missouri, C.V. Mosby, 1976. p. 570-582.

210. ZANEVELD, L.J.D., BHATTACHARYA, A.K., KIM, D.S., SCHUMACHER, G.F.B., and BELUHAN, Z. Primate model for the evaluation of vaginal contraceptives. American Journal of Obstetrics and Gynecology 129(4): 368-373. October 15, 1977.

211. ZANEVELD, L.J.D., ZATUCHNI, B., and HAHN, D.W. Animal testing for potency of vaginal contraceptives: development of a primate model. Presented at the Program for Applied Research on Fertility Regulation and Asociación Probienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala, April 25-27, 1979. 17 p. (To be published by Harper and Row)

212. ZATUCHNI, G. [Program for Applied Research on Fertility Regulation/Northwestern University] [Discussion of paper presented at the Program for Applied Research on Fertility Regulation and Asociación Pro-bienestar de la Familia de Guatemala International Workshop on New Developments in Vaginal Contraception, Guatemala City, Guatemala] April 27, 1979.

213. ZATUCHNI, G. [Program for Applied Research on Fertility Regulation] [Side-effect studies of nonoxynol] Personal communication, May 29, 1979.

214. ZELNIK, M., KIM, Y.J., and KANTNER, J.F. Probabilities of intercourse and conception among US teenage women, 1971 and 1976. Family Planning Perspectives 11(3): 177-183. May-June 1979.

215. ZIMMERMAN, M. [Program for the Introduction and Adaptation of Contraceptive Technology] [Spermicide use instructions for illiterates] Personal communication, July 18, 1979.

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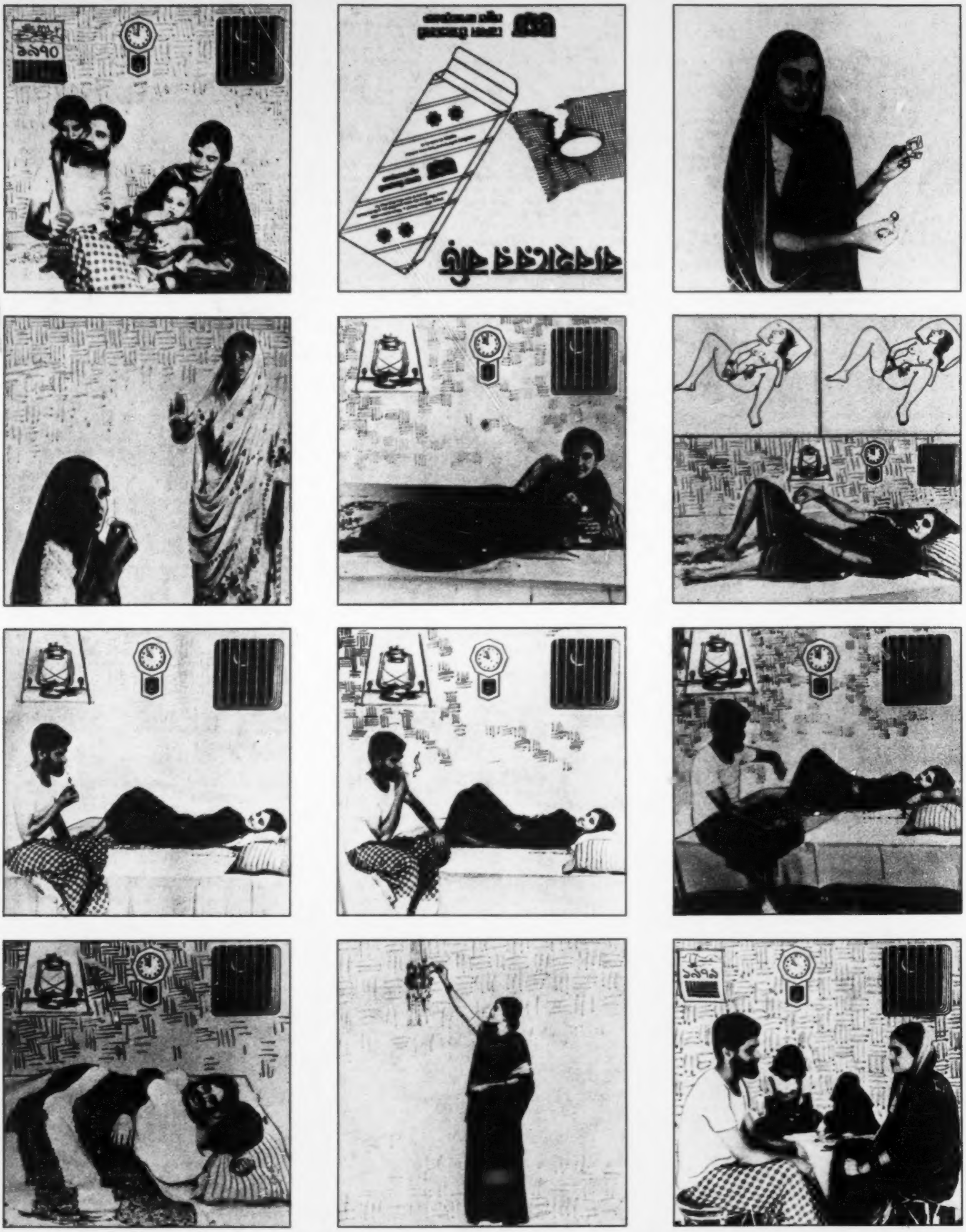

Figure 8. In Bangladesh, Concerned Women for Family Planning, with the assistance of the Program for the Introduction and Adaptation of Contraceptive Technology (PIACT), is developing and testing instructions for illiterate women in the use of "Joy" foaming spermicidal tablets. These pictures from a draft brochure illustrate some of the problems involved: for example, while no health care organization wants to appear to promote smoking, it has proved difficult to find any other way to make clear to people who may not be familiar with clocks the need to wait approximately 5 minutes after insertion and before intercourse so that the tablet can dissolve completely. (M. Zimmerman, Piact)

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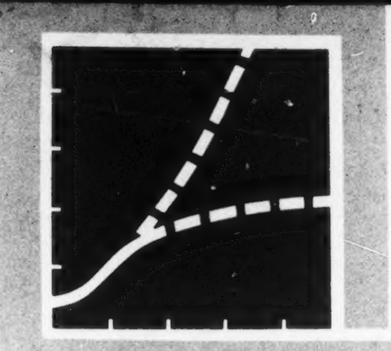

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November 1979

SPECIAL TOPIC MONOGRAPH

Population Information Program, The Johns Hopkins University, Hampton House, 624 North Broadway, Baltimore, Maryland 21205, USA

Age at Marriage and Fertility

Summary. Throughout the world, women who marry late — in their mid or upper 20s — tend to have fewer children than women who marry early. In Europe since the beginning of the modern era, in Japan during the first half of this century, and in a number of other Asian countries for the last three decades, delayed marriage has had an important effect in limiting population growth. Today age at marriage is less important than it used to be in determining how many children a couple will have because deliberate use of modern methods of birth control has become the single most important factor on a worldwide basis in determining family size.

Nevertheless, the age at which people marry will be particularly important for the next two decades because by 1990 there will be more than one billion young people of marriageable age — roughly 15-29 years old — in the developing countries. The decisions they make on marriage and childbearing will determine the pace of population growth for years to come. For countries that are trying to reach a balance between population and resources, policies that encourage this younger generation to postpone marriage will also encourage them to limit fertility after marriage and will contribute on a continuing basis to economic and social development.

Later marriage reduces rates of population growth because it means:

- a shorter period of reproductive life exposed to the possibility of pregnancy and
- a longer interval between generations.

At the same time, if women postpone marriage from age 16 to age 19, for example, or from 18 to 21, that delay means:

- women can stay in school longer and acquire skills and training for income-generating jobs;
- women can work before marriage to contribute to their own and their families' income or savings; and
- women can enter marriage with greater emotional and physical maturity to meet the challenges of family life.

All these opportunities, which are virtually closed to a girl who marries at 15 or 16, will not only help women understand the value of spacing children and limiting family size later, but also will enable them to play more active roles in family, community, and national development.

Throughout history, drastic changes in the age at which women marry usually have accompanied drastic changes in the economic, social, political, and religious environment that has encouraged early marriage. Even where change has been less rapid, rising age at marriage appears to have been, historically, a response to stress, a way — sometimes the only way — for young people to defer family responsibility until they had sufficient resources to support a family. Today, while age at marriage may still increase in response to stress — stress compounded by rapid population growth — it may also rise in response to opportunity — the opportunity for women to be educated and to work productively outside the home.

Regional Differences

In Western Europe, the demographic transition from high fertility and high mortality to low fertility and low mortality began as early as the 16th century, when a pattern of later marriage with resultant lower fertility was first established. The most rapid drop in fertility occurred in the late 19th century, however, with the spread of effective birth control technology. Today Europe has the lowest fertility rates in the world as well as the highest legal and actual ages at marriage. Moreover, Europe is the only area of the world where many countries have set the same legal minimum ages for both sexes.

In Asia, age at marriage and fertility currently run the gamut from child marriage and high fertility in Bangladesh and parts of India to marriage delayed until after age 23 in China, Japan, Korea, and Sri Lanka, with low fertility. In Japan, Korea, and Sri Lanka the usual age at marriage moved gradually upward during the first half of the 20th century with only slight declines in fertility. In the late 1940s abortion was legalized in Japan, and in the 1960s a national family planning program was initiated in Korea. Use of abortion and contraception led to rapid declines in fertility. In Sri Lanka age at marriage has continued to climb while fertility, especially among younger women, has declined to a moderately low level.

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Table 1. Early Marriage, Fertility, and Socioeconomic Factors: Regional Mean Rates Based on Most Recent Available Data (Weighted Means from Tables 3, 6, 9, and 10)

	% of Females Age 15-19 Ever-married	Age-specific Fertility Rate, 15-19	Total Fertility Rate	% of Females in School at 1st & 2nd Levels	% of Females Age 20-24 Economically Active	% of Population in Urban Areas
East Asia	2	9	2.5	92	61	65
Southeast Asia	20	101	5.2	57	38	20
Indian Subcontinent	58	101	5.5	40	17	19
Middle East	34	99	6.1	36	16	34
Africa	55	164	6.2	30	46	16
Latin America	17	89	4.9	73	39	57

The People's Republic of China has been the first government to embark on a deliberate program to increase the age at marriage to the mid or late 20s and, concurrently, to establish a comprehensive national family planning program — one with special emphasis on young people. As a result, birthrates have been cut in half since 1950. Chinese leaders now stress the one-child family as the way to check population growth since further increases in age at marriage are unlikely.

In East Asia, the largest fertility declines are occurring among older married women who want no more children rather than among younger women because postponing marriage or first birth is now customary. Asian trends appear to follow the European pattern, with some gradual, slight fertility declines associated with increasingly late marriage while subsequent, more rapid declines are associated mainly with the introduction of new, more effective methods to control fertility directly.

Outside East Asia (where the greatest changes in fertility have occurred), few clear relationships between age at marriage and total fertility rates are evident. In the Middle East, age at marriage has increased somewhat and fertility has declined somewhat, but not always in the same countries. The segregation of women, which is characteristic of more traditional Muslim societies, may encourage early marriage and high fertility.

In Africa, age at marriage is early, fertility high, and neither seems to have changed much. Paradoxically, within Africa, countries where early marriage is less common have slightly higher fertility than countries where early marriage is frequent. Health conditions, subfecundity, polygamy, and marital instability may make more difference in individual and national fertility rates in Africa than age at marriage.

In Latin America, some marriages can be defined as consensual unions, trial marriages, visiting unions, or some variation of these patterns. As a result, the age at legal marriage in Latin America and the Caribbean is usually higher than the age at which young women first become sexually active or bear children. In the last two decades age at marriage has not increased much, and most of the declines in fertility have occurred among older women. One explanation may be that family planning programs have been implemented in the context of maternal and child health care in order to minimize political and religious opposition. Therefore they have given less attention to the needs of younger women and men.

In the developing world as a whole, age at marriage is highest and fertility is lowest in East Asia. Both East Asia and Latin America have a higher percentage of women enrolled in school and of population residing in urban areas than other regions. Yet total fertility rates in Latin America are almost as high as in Southeast Asia, where education and urbanization rates are far lower (see Table 1). Fertility is highest in Africa and the Middle East, and age at marriage remains lowest in the Indian subcontinent and Africa.

Of 26 developing countries with population of over one million in which fertility has declined during the past two decades, rising age at marriage has contributed substantially to total fertility declines in eight: China, Hong Kong, Indonesia, Malaysia, the Philippines, Singapore, Sri Lanka, and Tunisia. In South Korea and Taiwan, prior increases in age at marriage facilitated fertility declines after 1950. Without changes in reported age at marriage, fertility among women 15-19 or 20-24 has declined substantially, with marked effect on the total fertility rate, in Brazil, Panama, and Peru.

Policy Implications

For policy makers, regional comparisons show that age at marriage, like fertility itself, interacts with other social and economic influences within a given society or culture. As a result, the status of women in a country and their access to education and employment may have at least as much impact on age at marriage as a legally enacted minimum age. Ultimately, both the status of women and age at marriage may depend more on the commitment of political leadership and on programs benefiting women which result from that commitment than on the specific laws on age at marriage.

Recent research has demonstrated that family planning programs and the use of contraception and abortion have had a greater impact in reducing fertility than has diffuse social change as measured by a variety of factors, including age at marriage. Yet, with more than one billion young people soon to reach the age for marriage and reproduction, all policies that can influence the fertility of young people are vital, and none of these policies should be considered in isolation. For example, family planning programs that emphasize sterilization or IUDs for older women who already have large families will not meet the needs of young women who want to postpone their first pregnancies. Similarly, policies that raise the age at marriage but do not at the same time make it possible for young people to acquire contraceptives may lead to higher rates of abortion and births out of wedlock. Continued education and income-generating employment for women will encourage both later marriage and smaller families, but if these opportunities exist only in the cities and not in rural areas, they will have little impact on most of the population.

For countries that want to achieve a higher level of socioeconomic development, the objectives of more education and employment for women, a higher age at marriage, and much greater availability of voluntary family planning services, especially for younger couples and in rural areas, are all interrelated aspects of the same process of demographic change and should be looked on as complementary and mutually reinforcing goals. **End of Summary**

BASIC ISSUES

The age at which women marry is an important factor in population growth. The reason is obvious: marriage often represents the socially sanctioned initiation of sexual activity and childbearing for women. For men, in addition to assuring convenient access to sexual relations, marriage constitutes a commitment to support the children born as a result of sexual activity (87, 154). Thus it is not surprising to find that, on a worldwide basis, early marriage is associated with high fertility and late marriage with low fertility.

Later marriage of women is also associated with many of the beneficial and productive aspects of developed societies. It permits women to achieve more education, to train for useful careers, to earn cash incomes, and to contribute in a more meaningful way to family, community, and national life. Later marriage allows women to enter matrimony on a more equal basis with their husbands, less as economic and social dependents. Later marriage may also encourage women to make decisions about childbearing and child raising based more on their own abilities and their children's needs than on traditions encouraging high fertility (84, 85, 254).

There are at least three important demographic reasons that individual women who marry early tend to have more children than those who marry later and to hasten population growth. If women marry young:

- they are likely to have sexual intercourse frequently throughout their most fecund years;
- they begin childbearing at an earlier age and thus live through a longer period of exposure to conception; and
- they shorten the interval before the next generation is born and begins childbearing.

All three of these factors mean more rapid population growth. Moreover, from a socioeconomic point of view, women who marry young tend to have less education and less opportunity to undertake jobs or roles other than motherhood. Bearing and raising children then becomes the major source of their status in the family and community. This lowers their incentive to limit family size.

Arithmetically, it is easy to demonstrate that, other things being equal, a family in which all women marry at age 15 and produce daughters every five years until age 40 will have more than five times as many living members after a period of 60 years as a family in which all women marry at age 25 and also produce daughters every five years until age 40 (see Figure 1). This substantial difference occurs because women married at age 15 would produce in 60 years five children apiece and the first member of the fourth generation, whereas women married at age 25 would produce in the same period only three children apiece and the first member of the third generation.

Despite the dramatic contrasts shown in Figure 1, there are a number of reasons that the impact of later marriage on fertility may in fact never reach the limit this hypothetical scheme suggests. These reasons include: the deliberate use of contraception and abortion to control fertility, regardless of marital status; the different definitions of marriage (and hence of age at marriage) in different cultures; the probability of more sexual activity and pregnancy outside of marriage as the age of marriage rises, a factor which varies in different cultures; and a number of other demographic qualifications and socioeconomic conditions that influence fertility differently at various ages, both within and outside marriage.

Figure 1. Arithmetic Impact of Age at Marriage on Population Growth: A Hypothetical Model

A = 1st generation
B = 2nd generation
C = 3rd generation
D = 4th generation
= married

Year	Age at marriage = 15	Age at marriage = 20	Age at marriage = 25
0	A is born	A is born	A is born
5	A	A	A
10	A	A	A
15	A	A	A
20	A B	A	A
25	A B B	A B	A
30	A B B B	A B B	A B
35	A B B B B	A B B B	A B B
40	A B C B B B B	A B B B B	A B B B
45	A B C C B C B B B	A B B B B	A B B B
50	A B C C C B C C B C B B	A B C B B B	A B B B
55	B C C C C B C C C B C C B C B	B C C B C B B	B B B
60	B C D C C C C B C C C C B C C C B C C B C	B C C C B C C B C B	B C B B
Female population after 60 years:	21	10	4

If all women give birth to daughters at 5-year intervals after marriage and until age 40, how much difference would age at marriage make to population size in 60 years? This diagram, showing only females in the population, illustrates the difference. If age at marriage is 15, shown in the left-hand portion of the figure, woman A marries in the 15th year and gives birth to a daughter, B, in the 20th year. By the 40th year, A has had five daughters and the eldest, B, has already married and gives birth to her first daughter, C. After 60 years, if age at marriage is 15, the total female population (assuming A dies between the 50th and 55th years) would be 21. If age at marriage is 20 (central portion of figure), the female population would be 10. If age at marriage is 25 (right), the female population would be 4.

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Phyllis T. Piotrow, Ph.D., Director; Helen K. Kolbe, M.S., Co-Director; Ward Rinehart, Editor.

The deliberate use of contraception and abortion to control fertility — which in Europe began in the last century and in many developing countries is now increasing rapidly — means that sexual relations can occur both within and outside of marriage without childbearing as an inevitable consequence. Fertility within marriage (marital fertility) has dropped sharply as the use of contraception has increased, especially among women who want no more children (134). As a result, even in Singapore and Korea, where age of marriage has increased as much as five to six years in the 20th century, with a concomitant reduction in fertility among the youngest women, substantial declines in overall fertility could not have occurred without the reduction in fertility among older women now using a variety of birth control methods. The growing use of contraception means that the initiation of sexual activity — as represented by age at marriage — is not as closely linked to fertility as it once was.

Further weakening the link between age at marriage and fertility is the variety of forms that marriage takes throughout the world. For example, marriage varies from a formal but unconsummated child marriage arranged by parents (as in some Asian countries) to a consensual union without legal or religious sanction contracted by consenting individuals (as in Latin America and the Caribbean). Marriage may be marked by the beginning of cohabitation, the beginning of sexual activity, the birth of a child, or a formal ceremony, or it may be a process in which these events occur over an extended period of time and not necessarily in the same order for every person in the society (87, 154, 299). Obviously the more marriage marks the beginning of sexual activity, the more strongly age at marriage will influence age at first birth and completed family size.

A third factor that also influences — and somewhat reduces — the impact of later age at marriage on fertility is the probability of more sexual activity outside of marriage as the age of marriage rises. Like the definition of marriage, this probability varies in different cultures. In regions where premarital sexual activity is strongly condemned and where unmarried men and women do not come into close contact, as in the Muslim countries, women who delay marriage will in effect be practicing sexual abstinence for several years longer. Their abstinence may well mean lower overall fertility.

Data from the developing countries on sexual behavior outside marriage are scarce. One of the best illustrations that sexual activity among unmarried women increases with age comes from the Costa Rica World Fertility Survey (313). Among 898 single women age 20-49 interviewed in the survey, 18.5 percent of the 20-24 year olds had had sexual relations, as had 33.8 percent of the 25-29 year olds. The percentages rose steadily with age to 53.7 percent among the 45-49 year olds.

While marriage undoubtedly increases both the opportunities for sexual intercourse and the likelihood that live births will result, there are few societies where sexual activity before marriage is nonexistent or where males, at least, find no sexual outlet except in marriage. How this premarital sexual activity affects fertility is influenced by the availability of birth control measures (299) as well as by the prevalence of prostitution and male homosexuality (198).

World Fertility Survey data now becoming available suggest that the higher the age at marriage, the higher may be the proportion of women having a child before or within seven months of marriage, that is, a child conceived before marriage (see Table 2). Thus there may be certain social costs if young people defer marriage until their middle or late 20s — including more illegitimate births and, if effective contraceptives are not available to unmarried women, more abortions (299). The benefits, however, appear to outweigh the costs. Certainly marriage at age 13-15 virtually insures that there will be no illegitimacy or premarital sexual activity, but this practice also creates a condition of lifetime dependency for these women (302).

The effects on fertility of raising the age at marriage of course depend on what that age was initially and how late marriage is deferred. On one hand, to postpone marriage from age 13 to age 16 would have very little effect on fertility since many girls of that age are not yet fully fecund. On the other hand, to postpone marriage from age 21 to age 24 could have a substantial effect on fertility since the early 20s are years of high fecundability and, whatever their level of sexual activity, unmarried women in any age group would be unlikely to produce as many live births as married women because of social and economic sanctions against out-of-wedlock childbearing.

Another qualification that complicates the simple notion that late marriage automatically means lower fertility is the possibil-

Table 2. Percent of First Births Occurring Before or Within the First 7 Months of First Marriage, by Age at First Marriage, in Countries with Published World Fertility Survey Reports[a]

	All	Age at Marriage in Years						
		Under 15	15-17	18-19	20-21	22-24	25-29	30+
ASIA & PACIFIC								
Fiji[b]	12.9	6.7	9.1	12.6	16.4	24.6	36.7	
Indonesia	9.0	c	10.0	9.4	11.7	14.6	10.7	
Korea, Rep. of	5.7	0.8	2.0	11.3	6.6	10.4	13.9	0.0
Malaysia	13.3	12.1	14.1	15.0	12.2	16.4	7.1	6.9
Sri Lanka	7.4	8.0	8.3	7.7	7.4	5.8	6.2	5.7
Thailand	11.6	4.5	9.3	13.4	12.0	14.3	19.8	11.9
LATIN AMERICA								
Colombia	19.6	14.9	13.6	19.9	22.5	22.9	30.4	44.3
Costa Rica[d]	26.2	7.1	19.5	25.2	26.3	36.0	39.8	47.3
Dominican Republic	6.3	4.3	4.6	7.6	8.2	8.5	13.4	25.0
Mexico	7.5	6.5	7.4		9.3		4.1	7.1
Panama	17.9	7.6	14.6	21.1	20.7	25.6	23.6	
Peru	14.9	12.9	19.1	17.0	16.8	16.3	10.5	7.1

[a] Base consists only of women first married at least five years before survey interview.

[b] Births before marriage and within 11 months of marriage.

[c] Under 13 years, 5.3; 13-14 years, 9.8.

[d] Base excludes women who had no children within 5 years of marriage.

Source: World Fertility Survey (45, 52, 70, 108, 139, 157, 169, 195, 208, 229, 313, 316), Table 2.1.1., except Fiji, E9; Indonesia, 3.5.1.

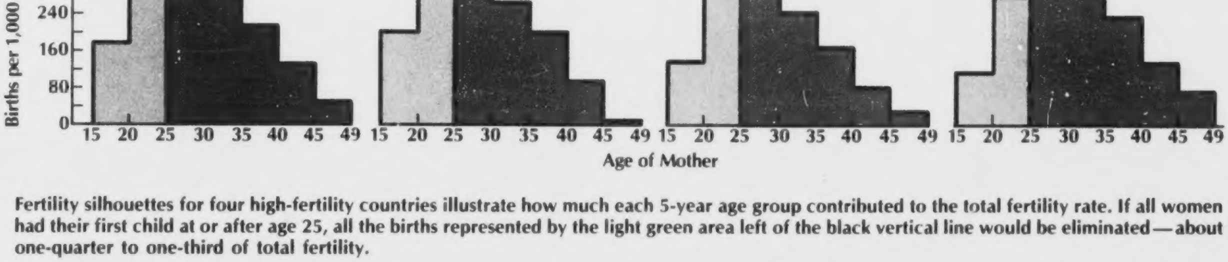
ity that women who marry later will have more children at an older age than women who marry young — a "catch-up" effect. World Fertility Survey data show that Latin American and Asian women who marry late average 10 and 50 percent more births, respectively, in the first five years of marriage than those who marry early (134).

Women who marry young also tend to experience greater marital instability during their reproductive lives. Separation and divorce both reduce fertility by reducing rates of sexual activity. Studies from both developed and developing countries suggest that women who marry before 20 are more likely to have unstable marriages than women who marry in their 20s (87, 103, 132, 133, 292, 309).

With all of these demographic qualifications, biological variations, and cultural differences, it becomes clear that the relationship between age at first marriage and fertility is not so simple as Figure 1 would at first suggest. Another way to depict, somewhat more realistically, what could be the maximum possible impact of delayed marriage on actual total fertility rates is shown in Figure 2. These fertility silhouettes for Kenya, Bangladesh, Iran, and Mexico — four high-fertility countries — show graphically the age-specific fertility rates for women in each 5-year age group from 15 to 49. The black line is drawn at age 25. If age at marriage were raised to 25 — a much older age than is realistic for the near future, if all births to the left of the black line ceased to occur, and if no catch-up increase in later births followed as a result, the total fertility rate would be reduced by about 25 to 35 percent. (This schematic approach must be qualified somewhat, however, because it is based on the fertility rates per 1,000 women in each age group. Because a large proportion of fertile women in these countries are younger than 25, such a reduction in the fertility rates of the younger women would mean a substantially smaller number of births in any given year.)

In short, comparing age at first marriage and total fertility or completed family size means evaluating the impact of the timing of a single social and cultural event on a series of biological events. Such a comparison assumes that the social event, marriage, is an accurate indicator of the beginning of a series of repeated biological events, sexual intercourse, that are the necessary cause of fertility. If sexual activity begins before marriage, however, it becomes difficult to make a clear evaluation.

Figure 2. Age-Specific Fertility Rates in Four Countries: The Contribution of Women Under Age 25



Fertility silhouettes for four high-fertility countries illustrate how much each 5-year age group contributed to the total fertility rate. If all women had their first child at or after age 25, all the births represented by the light green area left of the black vertical line would be eliminated — about one-quarter to one-third of total fertility.

DEFINITIONS OF DEMOGRAPHIC TERMS

Measures of Fertility

Crude birth rate (CBR). The number of live births per 1,000 population in a given year.

Total fertility rate (TFR). The average number of children that would be born alive to a woman during her lifetime if she were to pass through her childbearing years conforming to the age-specific rates of a given year. The total fertility rate equals the sum of the age-specific fertility rates.

Age-specific fertility rate (ASFR). The number of children born alive per 1,000 women in a specific age group. The age groups are usually 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, and 45-49. Age-specific rates calculated for 5-year age groups are summed and multiplied by five to arrive at the total fertility rate.

Marital fertility rate. The number of live births per 1,000 married women age 15-49 in a given year. Calculated by assuming that all births occur after marriage.

Measures of Age at Marriage

Percentage ever-married. The proportion of women in a specified age group who are or have been married.

Singulate mean age at marriage (SMAM). A summary of the marital pattern of a population at a point in time. It is calculated by adding the percentage never-married in each age group, subtracting from that sum the percentage never-married at age 50, and dividing that difference by the difference between 100 and the percentage never-married at age 50. If age at marriage is not changing and other assumptions are met, SMAM represents the mean age at marriage for a group of women all of whom marry by age 50.

Other Terms

Age-sex structure. The composition of a population as defined by the number or proportion of males and females in each age group.

Period measures. Statistics that measure events occurring to all or part of the population in one period of time. Crude birthrates, total fertility rates, singulate mean age at marriage, and proportion married are all period measures.

Cohort measures. Statistics that measure events occurring over time to a cohort, or group of people, sharing a common demographic experience such as year of birth. Completed family size and total number of live births to women who have completed their childbearing are cohort measures of fertility. Mean age at marriage and cumulative proportion married by a given age also are cohort measures.

Demographic transition. The shift occurring in a population from high levels of mortality and fertility to low levels. The shift eventually results in a low rate of population growth. Because the decline in mortality rates precedes the decline in fertility rates, however, a period of rapid population growth occurs during the transition.

Sources: based on Hajnal (92); Petersen (198); Population Reference Bureau (201).

Also, the evaluation often assumes that marrying later merely postpones a woman's pattern of childbearing without otherwise changing it. But if patterns of childbearing change because of conscious fertility control, more childbearing outside of marriage among those who marry late, and more exposure to intercourse due to less widowhood, divorce, and separation among women who marry late, then the relationship between nuptiality and fertility trends is even less obvious. These two problems — the relationship of marriage to sexual exposure and the differences in the reproductive behavior of those who marry at different ages — are major demographic issues in assessing current patterns and trends in age at marriage and fertility.

Socioeconomic Factors

Delayed marriage has been described by Kingsley Davis as part of the typical "multiphasic demographic response" to population pressures (58). Migration to seek better jobs and use of available techniques to curtail fertility are also a part of this multiphasic response. Together they precipitate the demographic transition that has already brought the developed countries from high fertility–high mortality to low fertility–low mortality (326). Developing countries are following a comparable process today, although frequently at a much accelerated pace.

With respect to age at marriage and fertility specifically, Judah Matras has suggested that during the modernization process a country will go through four stages of adjustment to population growth: (1) early marriage–uncontrolled fertility, (2) later marriage–uncontrolled fertility, (3) later marriage–controlled fertility, and finally (4) early marriage–controlled fertility (165). A number of Asian countries seem to be following this pattern.

Accompanying these demographic changes are a variety of socioeconomic changes that reflect and are part of the development process. Researchers and policy makers have devoted much attention to exploring the relationships between fertility and socioeconomic factors. The most comprehensive recent analysis, using data from 94 countries, is by Parker Mauldin, Bernard Berelson, and Zenas Sykes (166). They compared the relative contributions of family planning programs and social setting to declines in crude birthrates from 1965 to 1975. While they observed that, not surprisingly, "The two — social setting and program effort — go together most effectively," their overall conclusion was that:

> Large CBR declines in developing countries were strongly associated with substantial program effort, and high social setting was associated with only modest CBR declines, unless linked with significant family planning effort (166).

While Mauldin and Berelson did not look specifically at the relationship of age at marriage to fertility, they found that age at marriage was moderately related to other indicators of social setting — measures of female school enrollment, infant mortality, and urbanization. These factors were linked to crude birthrates, all to about the same degree (166). Further work shows age at marriage similarly associated with birthrates (171).

In a comparable study, K.S. Srikantan analyzed the relationship of 22 socioeconomic indicators with each other and with the demographic status of both developed and developing countries, using data from about 1970. He found age at marriage linked to about the same degree to each of the other measures, but most closely to female literacy and school enrollment rates. Relating the age at marriage to population change, he found that the percentage of women married at age 15-19 ranged from 2 to 22 in 23 countries identified as having completed the

Just married, a young couple leaves the church in La Paz, Bolivia. Religiously sanctioned marriages, as well as consensual unions, have not always been recorded in Latin American censuses, making trends in age at marriage difficult to assess. (United Nations/Rothstein)

demographic transition and from 13 to 79 in 24 countries that had not yet made the demographic transition. The percentage married at age 15-19 ranged from 4 to 37 in nine countries identified as being in transition (227).

Several studies have looked at the relationship between socioeconomic measures and age at marriage without special reference to fertility. Ruth Dixon, analyzing data from 33 countries in Eastern Europe, the Middle East, and Asia, found that the percentage of women age 20-24 who were married was fairly closely linked to the percentage of women gainfully employed and to female literacy rates, but less closely to two measures not specific to women — urbanization and per capita income (67). Peter Smith has reported that in Indonesia, Thailand, and the Philippines, regional measures of social and economic factors associated with development are linked to later marriage in the major cities, but that regional differences based on religious and cultural distinctions remain even after development factors are taken into account (222).

From a socioeconomic point of view, one of the great difficulties in studying age at marriage and fertility lies in determining what cause-and-effect relationships exist among age at marriage, fertility, and various socioeconomic factors. The relationships are important to policy makers, since causes, once identified, can sometimes be manipulated in order to produce effects — for example, more higher education can be provided for women if more education causes women to marry later, have fewer children, and obtain better jobs. Likewise, minimum legal age at marriage can be raised if later marriage will allow women to continue their schooling and reduce their fertility. Exploring cause-and-effect relationships requires, first, determining how much of a documented change in fertility is due to deliberate birth control, how much is due to change in the age at marriage, and how much to the age and sex composition of the population. Second, it requires examining what motivates later marriage and what motivates contraceptive use to find points of leverage to bring about change.

Analyses that seek to explain fertility in terms of age at marriage on one hand and marital fertility on the other are basically efforts to distinguish the means for averting the first birth from the means for averting later births. Age at marriage is used as a proxy for the beginning of sexual intercourse, with abstinence assumed to be the means of avoiding births before marriage and contraception the means after marriage.

Efforts to distinguish the motivations for later marriage from the motivations for contraceptive use find, however, that the social and economic factors involved are similar. This makes it difficult to sort out the extent to which social and economic factors influence age at marriage, in turn affecting fertility, from the direct influence of social and economic factors on fertility. In the long run, the distinction may not be important, however, if the end result is the same.

Finding socioeconomic points of leverage to influence age at marriage is complicated by the fact that age at marriage and first birth influence social and cultural events as well as the other way around. Events such as leaving school, marrying, being involved in the money economy, and having a child are all interrelated. The causal and temporal order of these events varies from one woman to the next. Some women leave school or jobs to marry, some leave school or jobs because they are pregnant, some postpone childbearing to attend school or to work, some consider themselves married only after they have a child, some marry in order to have a child, and so on. While it is relatively easy to identify associations among age at marriage, fertility, and socioeconomic factors, it can be difficult — often impossible — to determine what is cause and what is effect (314).

TECHNIQUES OF ANALYSIS

To quantify more precisely what has actually happened to fertility when marriage is delayed, a number of analytical techniques and indexes have been developed. Some of the demographic terms used are described in the box on p. M-110.

In this issue of **Population Reports**, which offers an overview of developing country data, one index is used throughout to measure age at marriage and two to measure fertility. Age at marriage is measured in this report by the percentage of women ever-married at age 15-19. These data can be gathered, with fair degrees of accuracy, from surveys and census questions which ask women what their age is and whether they are married. The proportion married in the 20-24 age group could also be used for comparisons, and this information is included for countries where few women marry before age 20. For most of the developing countries today, however, the 15-19 age group provides a more sensitive indication of levels and trends in age at marriage.

Fertility, in this issue of **Population Reports**, is measured by (1) the age-specific fertility rates, usually expressed as the number of births per 1,000 women in a 5-year age group, and (2) the total fertility rate (TFR), which is the sum of age-specific fertility rates for women of reproductive age (see box for technical definition).

Comparisons in the report among countries and regions for which recent data are available are based on these three measures. The cross-sectional relationships, as depicted in Figures 4, 9, 11, and 12 and in columns 2, 6, and 8 of Tables 3, 6, 9, and 10, generally show a moderate association between later marriage on one hand and lower age-specific and total fertility rates on the other. The association is especially close in Asia.

Trends over time are analyzed using changes in the percentage of women ever-married at age 15-19, changes in the total fertility rates, and changes in the age-specific fertility rates of women at various ages. Trends among younger women are compared with the trends among older women to assess roughly what proportion of the change might be caused by increases in age of marriage, which are assumed to affect only women under 25, and what proportion might be caused by increases in use of deliberate fertility control methods, which are assumed to account for all of the decline in fertility among women over 35 and much of the decline among women between 25 and 34.

Another technique often used to measure the relative contributions of different factors to fertility declines is known as "decomposition technique." This method separates, or "decomposes," the causes of change in birth or fertility rates into various components, including changes in the number of women of reproductive age, changes in the proportion currently married (determined largely by age at marriage but also by widowhood and divorce), and changes in fertility within marriage determined largely by use of birth control measures (see Tables 4 and 7).

Decomposition analysis assumes that sexual activity is confined to marriage. If, in fact, the prevalence of sexual activity among the unmarried rises with age at marriage or if any unmarried women avoid giving birth by using contraception or abortion, the decomposition technique will overestimate the effect on fertility rates of changing age at marriage and underestimate the effect of contraception and abortion (299).

Assessing Socioeconomic Factors

Some of the social and economic factors that have been found to influence age at marriage in various countries are per capita income, degree of urbanization, number of people per unit of land in agricultural areas, changes in agricultural technology that influence the size of farms, educational opportunities for women, and labor force participation by women (67, 135, 166, 223, 227, 336). The age at marriage for men is affected by social or economic definitions of maturity — when men are thought capable of supporting a wife and children. Age at marriage for women is affected by three important factors which sociologist Ruth Dixon has described as (1) the *availability* of marriage partners, which is influenced by age and sex ratios in the marriage market; (2) the *feasibility* of marriage, which is influenced in large part by financial opportunities and constraints; and (3) the *desirability* of marriage in terms of how each partner sees the relative advantages and disadvantages of marriage compared with the available alternatives (67). The wider availability of nonmarital productive roles for women, which would certainly influence the desirability of marriage, can be expected to encourage some women to delay marriage. At the same time, if women were not expected to marry until the age at which men first marry, then their productive roles might be expected to change, becoming more like the productive roles of men.

In this issue of **Population Reports** the indexes used to measure these social and economic factors are the percentage of women of school age who are enrolled in primary or secondary schools, the percentage of women age 20-24 who are economically active outside their own homes, and the percentage of total population living in urban areas (see Tables 3, 6, 9, and 10).

No single measure or technique provides a complete picture of different fertility levels, marriage patterns, or socioeconomic change either among countries or over various time periods, and any set of measures has its difficulties. Nevertheless, cross-sectional and trend comparisons of the data available for many countries on age at marriage and fertility and on education, employment, and urbanization provide some clues to how much effect changing age at marriage has had on fertility in different regions of the world.

EXPERIENCE OF DEVELOPED COUNTRIES

One of the first to recognize age at marriage as an important factor in population growth and to propose economic and social policies based on that recognition was the 18th-century English clergyman Thomas Malthus. Observing from past experience that populations tend to increase by a geometric progression (that is, 2, 4, 8, 16, 32, etc.), whereas food production increases at an arithmetic rate (that is, 2, 4, 6, 8, 10, etc.), he declared that

> the perpetual tendency in the race of man to increase beyond the means of subsistence is one of the general laws of animated nature which we can have no reason to expect to change: (160)

Two elements could keep population growth in check, Malthus believed — "positive checks," which affect mortality, such as poverty, war, sickness, and famine; and "preventive checks," which affect fertility, such as delayed marriage and permanent celibacy (159). Contraception and abortion were also preventive checks, Malthus acknowledged, but he rejected them as vices. Moral restraint, on the other hand, demonstrated by sexual abstinence and delay of marriage, provided time for saving "and acquiring habits of sobriety, industry, and economy which would enable [a person] in a few years to enter into the matrimonial contract without fear of its consequences" (159).

Western Europe

These views, as Ansley Coale has pointed out, were a reasonable and empirical interpretation of the European demographic situation at the end of the 18th century (49). Both late marriage and a high proportion of unmarried people had long been characteristic of Western Europe. John Hajnal has demonstrated that during the 19th century and earlier nearly 70 percent of the women in Western Europe remained unmarried in their early 20s and about 15 percent never married, whereas in Eastern Europe less than 30 percent remained unmarried in their early 20s and less than 5 percent never married (92). In fact, a line could be drawn roughly from Leningrad to Trieste dividing European populations into a late marriage–lower fertility pattern to the west and an early marriage–higher fertility pattern to the east (49, 92). Ireland is frequently cited as the most extreme case of a society in which, even though methods of voluntary contraception were almost totally absent, population declined sharply in the late 19th and early 20th centuries in part due to the high proportion of the population marrying late or not marrying at all (135).

Several reasons for this seemingly unique Western European pattern of late marriage have been suggested. The most widely advanced explanation is the "stem family" tradition going back at least to the 16th century (92). Essentially, in a stem family system primogeniture prevails. Only one son inherits the family land, and he must wait to marry until his father dies or is ready to make arrangements so the son can marry and support his own family on that land (87, 154). As life expectancy increases, marriage may be postponed still further. This pattern of stem family inheritance and small landholding combined with the economic pressures of a growing population, rather than any conscious motivation to control marital fertility, seems to have been responsible for the relatively high age at marriage in Western Europe.

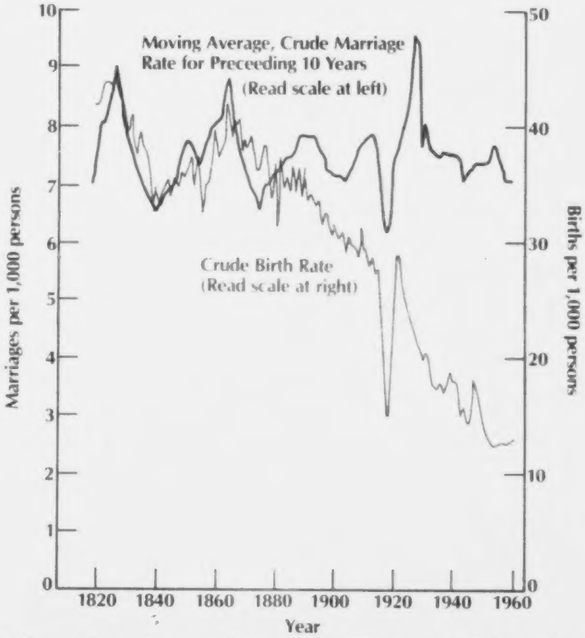
This situation changed in the last half of the 19th century. At that time a number of other factors, both indirect and direct, began to have an important effect both on age at marriage and on marital fertility. The factors indirectly affecting fertility were: new farm technology, which reduced the value of children as farm laborers; urbanization, which hastened the spread of new ideas and practices; industrialization, which produced jobs outside the home for women as well as men; opportunities for more education for both sexes, which increased both the age at which those seeking education could marry and the cost of children who would later have to be educated; and, finally, increased migration, which created imbalances in the ratio of marriageable men to marriageable women in an area.

Even more important, however, the late 19th century saw a rapid diffusion through much of Western Europe of contraceptive information and products (100). The products included various spermicides and douches and, somewhat later, caps, diaphragms, and mass-produced condoms (196). As Figure 3 shows for the province of Tuscany, marriage rates and birthrates, which had been closely linked to one another for the first three-quarters of the century, began to diverge in about 1870. Birthrates dropped rapidly while marriage rates remained the same or even increased. What had been once a clear and close relationship between marriage and childbearing was altered by the introduction and publicizing of more effective methods of contraception. This, more than any other single factor of socioeconomic change, is now thought to be the major reason for the decline in fertility levels in Europe (323).

In fact, the proportion married has increased since the mid-19th century in much of Europe and the age at which marriage usually takes place has declined for both men and women, while at the same time marital fertility rates have dropped to some of the lowest levels ever recorded. During the same period, illegitimate fertility rates have dropped precipitously along with marital fertility rates, declining in most countries by 50 percent or more (219, 299). In other words, "the spread of the knowledge and skills to avoid unwanted births enabled both married and unmarried couples to reduce their fertility simultaneously" (323).

Nevertheless, while age at marriage and the subsequent tempo of childbearing are not as closely linked in the developed countries as they were in the past, age at marriage still remains an important determinant of completed fertility for any individual woman. In the United States, for example, where 62 percent of ever-married women use some method of fertility control (317), National Fertility Survey data show that both wanted and unwanted fertility are higher among women who marry at an earlier age (292). This relationship between high fertility and early age at marriage diminishes but does not disappear even when education, husband's occupation, farm background, and religion are taken into account (23, 24). In Great Britain, in the United States, and in Australia, those who marry before age 20 have, on the average, one child more than those who marry at ages after age 25 (25, 59, 292). Analyzing why age at marriage should continue to be at all important in determining fertility when means of contraception are readily at hand, Lincoln Day suggests some 20 different factors, including individual physiology, fecundability, self-selection (which includes education and employment possibilities), ability and willingness to control fertility, desired number of children, and demographic experience (60).

Figure 3. Marriage Rates and Birth Rates in Tuscany, 1819-1959



In the province of Tuscany, before about 1870 the crude birth rate and the marriage rate (the average number of marriages per 1,000 persons in the preceding 10 years) were directly and closely related. Then, as contraceptive practice spread, the birthrate dropped, while the marriage rate remained near the previous level. The pattern is typical of many areas of Western Europe.

Source: Coale (47)

Some of the obvious influences on age at marriage, such as child marriage, education, and job opportunities, may be susceptible to change by deliberate government policies, but others may be deeply rooted in individual and cultural differences that are not easily altered by laws or government policies. Thus, within a society, age at marriage may continue to be an important predictor of individual fertility no matter what changes are observed in aggregate fertility rates for the whole society.

ASIA

In Asian countries where women marry late, total fertility is low; where they marry early, it is relatively high. The trends that have brought this relationship about, however, have not always occurred simultaneously. In some countries substantial rises in age at marriage took place in the first half of the 20th century apparently without marked drops in total fertility, which have begun since 1950. Through the early 1960s, lower fertility among young women, associated with later marriage, contributed substantially to total fertility declines. More recently, as family planning programs have grown and fertility has dropped more rapidly, lower fertility among older women, most of whom are married, has accounted for more — and usually most — of the total fertility decline.

Prevalence of Early Marriage

A comparison between current age at marriage and current fertility rates shows that the countries of Asia range from early marriage–high fertility to late marriage–low fertility patterns (see Figure 4). Looking at Asia as a whole, the mean total fertility rate for countries where few women marry before age 20 is near three, while, for countries where many women marry before age 20, it is slightly over five.

Geographic patterns are apparent. In the Indian subcontinent, except for Sri Lanka, early marriage is the rule and the total fertility rate is high; in Southeast Asia (Burma, Indonesia, Malaysia, the Philippines, and Thailand) except Singapore, early marriage is moderately common and the total fertility rate is moderate, and in East Asia (Japan, South Korea, Hong Kong and Taiwan), early marriage is the exception and the total fertility rate is low (see Table 3 and Figure 4). In China, although data are few and controversial, early marriage seems to be extremely rare and birthrates are probably under 20 per 1,000 (35).

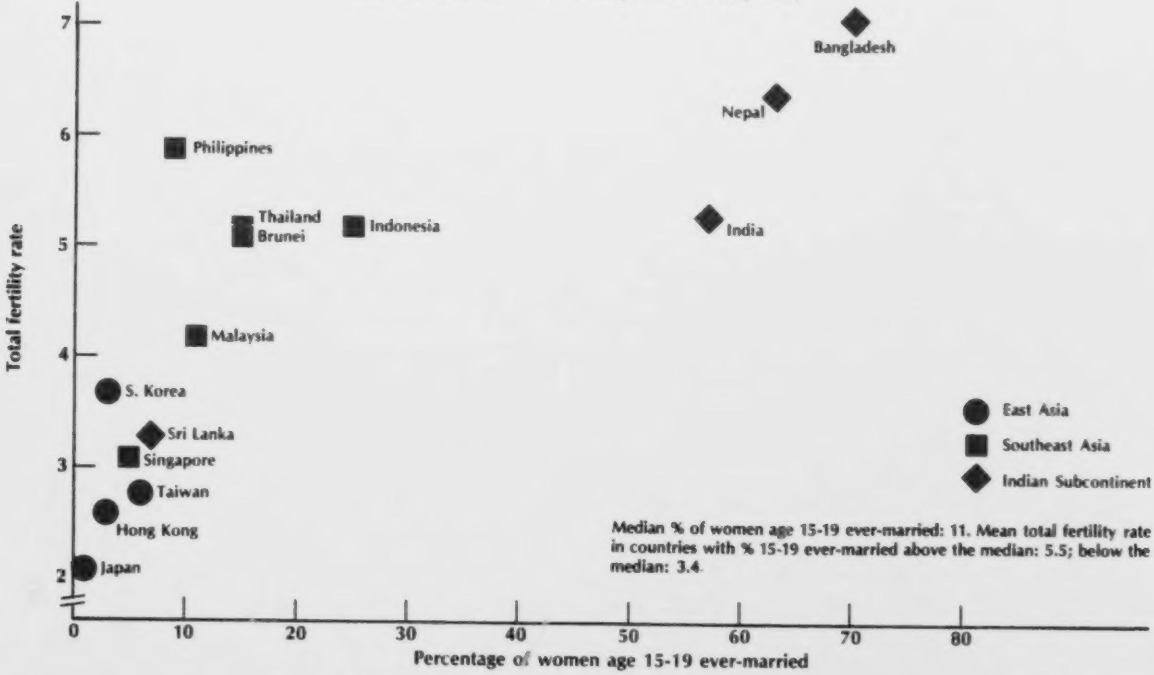
Trends in Age at Marriage and Fertility

An examination of trends in Asia reveals that fertility can remain high even when women are marrying later. Rising age at marriage has been documented since the early 20th century in Sri Lanka, Japan, South Korea, Taiwan, and the Philippines. These increases took place well before substantial declines in fertility. In fact, fertility rates in most of these countries were still high — at least five — in the early 1960s (see Figures 5-8). In Japan, for example, by 1920 only about 18 percent of women 15-19 were married, while the total fertility rate was still over five (241). In Korea, by 1955 only about 15 percent of women 15-19 were married, yet the total fertility rate was between 5.6 and 6.3 (144).

To estimate how much of the decline in total fertility is caused by a rising age at marriage and how much by changes in marital fertility, "decomposition" techniques can be used. Although these studies assume no sexual activity outside of marriage and therefore underestimate the impact of contraceptive use and abortion by the unmarried, they do provide an estimate of the upper limit of the effect of changing age at marriage on fertility (see Table 3).

Using decomposition techniques, Lee-Jay Cho and Robert Retherford examined trends in South Korea, Taiwan, West

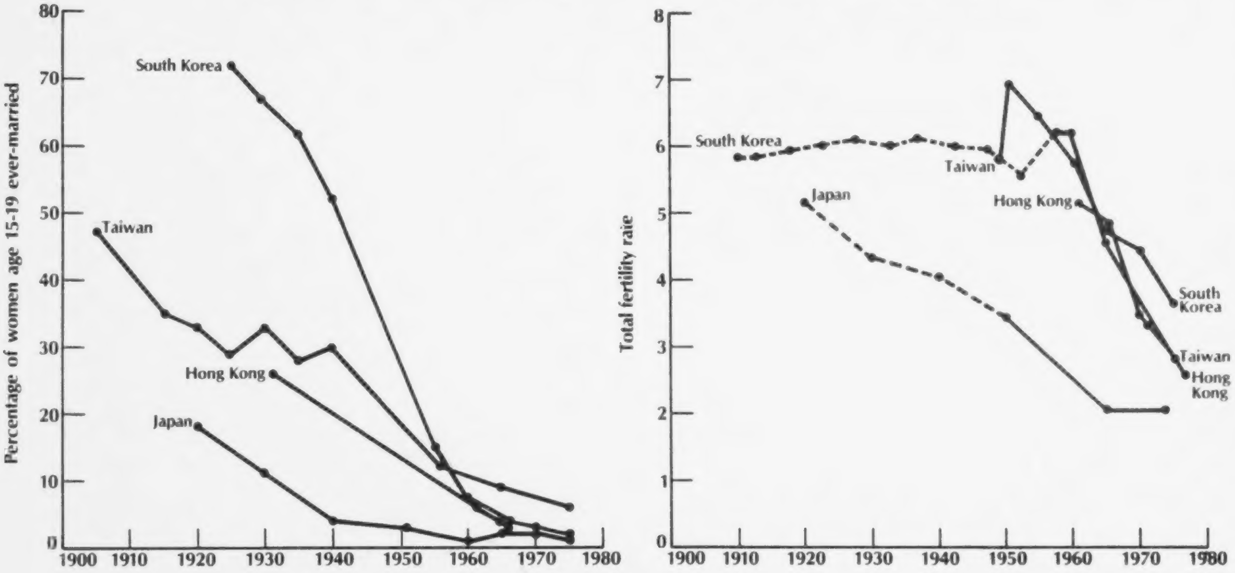
Figure 4. Fertility Rate by Percentage of Women Age 15-19 Ever-Married, Most Recent Available Comparable Data, Asia



Median % of women age 15-19 ever-married: 11. Mean total fertility rate in countries with % 15-19 ever-married above the median: 5.5; below the median: 3.4.

This figure and Figures 9, 11, and 12 illustrate the relationship between age at marriage and total fertility in developing regions. Countries located toward the lower left portion of the graph have both low total fertility rates and low percentages of women 15-19 ever-married. Countries located toward the upper right have both high total fertility and high percentages married. The closer the country symbols come to forming a diagonal line, the closer the relationship of total fertility and age at marriage in the region. In Asia, with a wide range of fertility rates and usual ages at marriage, the relationship is closer than in any other developing region.

Figure 5. Trends in Early Marriage and Total Fertility, East Asia, 1900-1976

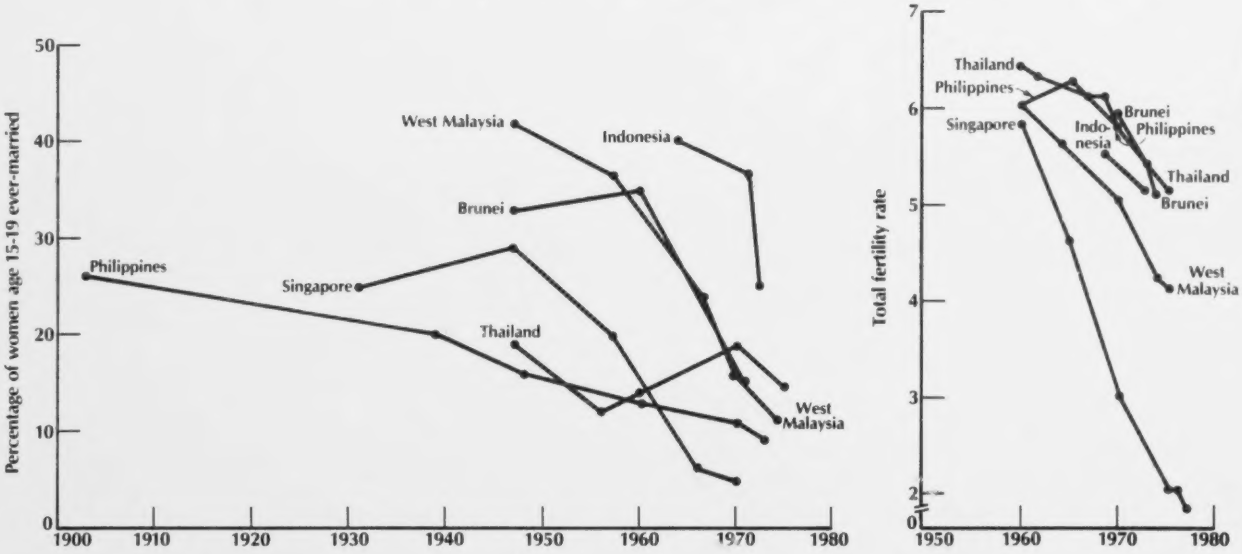


This figure and Figures 6, 7, and 10 show trends over time in the proportion of women age 15-19 ever-married on the lefthand graph and trends in the total fertility rate on the righthand graph (green lines). In East Asia, both the proportion married at 15-19 and the total fertility rate have reached low levels in the countries shown, but, where data are available, declines in proportion married preceded declines in fertility by several decades.

Note: Total fertility rates for Japan, 1920-1950, and Korea, 1910-1955/60, estimated from crude birth rates (source: Japan, Taeuber (241); Korea, Kwon et al. (144) on the basis of total fertility rates in countries with similar crude birth rates.

Source: Blayo (18); Kwon et al. (144); Taeuber (241); see also Table A3 in supplement, available on request.

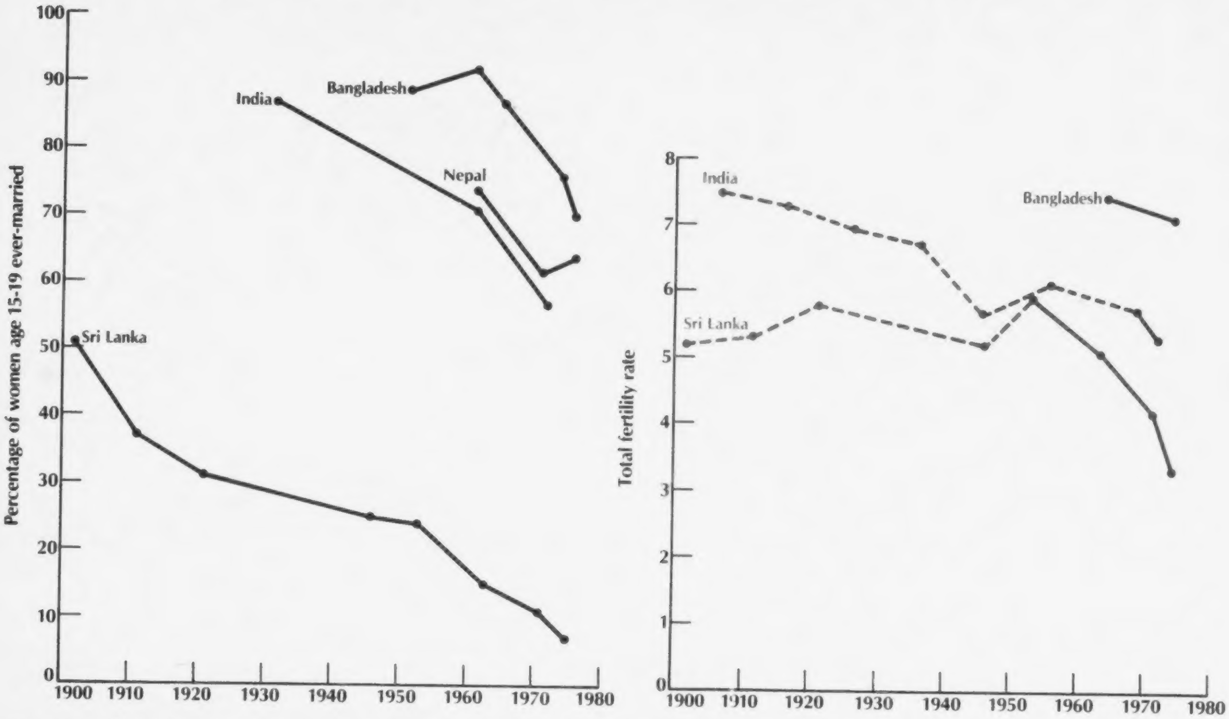
Figure 6. Trends in Early Marriage and Total Fertility, Southeast Asia, 1903-1979



In all Southeast Asian countries with available data, total fertility has declined, if to varying points (right). These declines have accompanied a decrease in the proportion of women 15-19 ever married in Brunei, Singapore, and West Malaysia (left). By contrast, in the Philippines and Thailand, the proportion married at age 15-19 has been low for some time, but fertility rates were still high in 1960.

Source: See Table A3 in supplement, available on request.

Figure 7. Trends in Early Marriage and Total Fertility, Indian Subcontinent, 1911-1975



The proportion of women age 15-19 ever-married (left) remains quite high in India and Bangladesh despite declines that have been especially marked recently. In contrast, the proportion married in Sri Lanka has been low for some time and continues to drop. Total fertility rates (right) correspond to proportion married, but the drop in fertility in Sri Lanka began only in the early 1950s, when the proportion married was already moderately low.

Note: Total fertility rates for Sri Lanka, 1901-1946, estimated from crude birth rates (source: Sri Lanka (228) on the basis of total fertility rates in countries with similar crude birth rates.

Source: See Table A3 in supplement, available on request.

Malaysia, Japan, and the Philippines during the 1960s. In Korea the crude birthrate fell from 43.3 to 29.0, with 35 percent of the decline attributed to changes in the marital structure, including age at marriage, and 65 percent attributed to changes in marital fertility and in the age-sex structure of the population. In Taiwan, the crude birthrate fell from 38.7 to 27.1, with 23 percent of the decline attributed to changes in marital structure. In West Malaysia the crude birthrate fell from 42.9 to 34.6, with 67 percent of the change attributed to the change in marital structure. In Japan and the Philippines during the 1960s there was little change in crude birthrates (43).

"Decomposing" the decline in the crude birthrate in Java and Bali in Indonesia from 38 in 1967-1971 to 34 in 1976, Jeanne Sinquefield and Bambang Sungkono reported the crude birthrate that would have resulted in 1976, first, if marriage patterns had changed but marital fertility had remained what it was in 1967-1971 and, second, if marital fertility had changed but marriage patterns remained what they were in 1971. (The effects of changes in age-sex structure and of interaction among factors are not reported.) In Java and Bali combined, the birthrate would have been 37 if only marriage patterns had changed, 36 if only marital fertility had changed; in actuality, with both changing, it was 34 (221).

Using data for Java and Bali from the same source, Terence and Valerie Hull and Masri Singarimbun estimated that 25 percent of the decline in the total fertility rate from 5.3 in 1967-1971 to 4.5 in 1976 was due to changing marriage patterns. Most of the remainder they attributed to declining fertility within marriage (104).

An alternative way to gauge roughly the contribution of postponed marriage to declining fertility rates is to compare the changes in fertility rates among younger women with the changes in fertility rates among older women. Presumably most of the declines in fertility among younger women are due to later marriage and most of the declines among older women are due to use of contraception, although some unmeasured proportion of the reduction in early births may also be due to contraceptive use and abortion and some of the fertility decline among older women could be due to separation of spouses through migration and to greater marital instability. The results of this type of analysis often contrast sharply with those of decomposition analyses using the same data, as the table below illustrates. The percentage of total fertility decline attributed to rising age at marriage as estimated by decomposition analysis appears in column A; the percentage attributable to women 15-24, in column B.

	(A)	(B)
Korea, Rep. of	35	26
Malaysia, West	67	46
Taiwan	23	7

Source: based on data from Cho & Retherford (43)

Decomposition analyses tend to attribute more of the fertility decline to changing marriage patterns than can be explained by the changing fertility of women 15-24.

Table 3. Marriage, Fertility, and Socioeconomic Factors, Most Recent Available Data, Asia

Region and Country	Year	% Females Age 15-19 Ever-Married	Rank Order	Source Code[a]	Year	ASFR Age 15-19	Rank Order	TFR	Rank Order	Source Code[a]	Year	% Females in School at 1st & 2nd Levels[b]	Rank Order	Year	% Females Age 20-24 Economically Active[c]	Rank Order	% Urban[d]	Rank Order
EAST ASIA																		
Japan	1975	1	1	M25	1974	5	1	2.1	1	F22	1975	97	1	1975	67	2	72	2
Hong Kong	1971	3	2	M13	1976	18	3	2.6	2	F12	1975	79	3	1976	74	1	100	1
Korea, Rep. of	1974	3	2	M28	1975	8	2	3.7	4	F25	1976	80	2	1970	44	4	41	4
Taiwan	1975	6	4	M67	1975	37	4	2.8	3	F51		NA		1975	55	3	61	3
Unweighted mean		3				17		2.8				85			60		69	
Weighted mean[e]		2				9		2.5				92			61		65	
SOUTHEAST ASIA																		
Singapore	1970	5	1	M47	1977	14	1	1.9	1	F45	1976	79	2	1977	72	1	63[f]	1
Philippines	1973	9	2	M42	1968-72	56	3	5.9	6	F36	1975	86	1	1970	34	5	32	2
Malaysia, West	1974	11	3	M33	1975	47	2	4.2	2	F32	1975	65	3	1970	42	4	29	3
Brunei	1971	15	4	M8	1974	60	4	5.1	3	F6		NA		1971	30	7	NA	
Thailand	1975	15	4	M67E	1974-75	84	5	5.2	4	F58	1976	58	4	1976	47	2	13	6
Burma	1973	22	6	M9		NA		NA			1974	49	5	1975	47[g]	2	19	4
Indonesia	1973	25	7	M19	1971-75	127	6	5.2	4	F16	1976	48	6	1971	33	6	17	5
Unweighted mean		15				65		4.8				64			44		29	
Weighted mean[e]		20				101		5.2				57			38		20	
INDIAN SUBCONTINENT																		
Sri Lanka	1975	7	1	M55	1974	31	1	3.3	1	F49	1976	64	1	1971	43	1	22	1
India	1971-72	57	2	M16	1971-72	89	2	5.3	2	F14	1976	40	2	1971	18	3	20	2
Nepal	1976	63	3	M36	1976	141	3	6.4	3	F33	1975	8	4	1971	39	2	5	4
Bangladesh	1976	70	4	M5	1974	198	4	7.1	4	F2	1976	37	3	1974	3	4	9	3
Unweighted mean		49				115		5.5				37			26		14	
Weighted mean[e]		58				101		5.5				40			17		19	
ALL COUNTRIES																		
Unweighted mean		21				66		4.4				61			53		36	
Weighted mean[e]		41				87		5.0				51			28		26	

NA = not available
ASFR = age-specific fertility rate
TFR = total fertility rate

[a] Codes refer to source information in Table A3 of supplement, available on request.

[b] Source: UNESCO (267), Table 3.2. The gross school enrollment ratio at the first and second levels is the total enrollment of pupils of all ages at those two levels divided by the population of official school ages for those two levels. For countries with nearly universal education of the school-age population at the first level, the gross enrollment ratio will exceed 100 if many pupils are older than the official school ages. Second-level schooling includes general education, teacher training, and other secondary-level vocational-technical training. All ratios are expressed as percentages.

[c] Source: International Labour Office (121) Table 1A or (122) Table 1 unless otherwise noted. Economically active population defined as employers, the self-employed, employees, unpaid family workers, members of producers' cooperatives, members of the armed forces, and unemployed persons with previous job experience.

[d] Source: 1970 data from World Bank (294) p. 510-513. Percentage of the population living in urban areas, generally defined as cities and towns; national definitions vary.

[e] Mean weighted by 1975 population as reported in US Bureau of the Census (280)

[f] As of 1960

[g] Source: International Labour Office (122) Special Table. ILO projections for midyear 1975.

Table 4. Selected Studies of the Components of Fertility Change in Asian Countries 1930-1975, Using Decomposition* Techniques

Country and Studied	Author, Date, Reference No.	Observations and Conclusions
Fiji **1965/66-1974/75**	Mauldin et al. (166)	CBR declined by 22%, from 35.7 to 28.0. If 1965-1966 age structure and marital fertility had prevailed in 1974-1975, the changes in percentage married would have lowered the CBR by 2.2 points and accounted for 29% of the overall decline. However, changes in the age structure, given 1965-1966 marital fertility and percentage married, would have raised the CBR by 1.6 points. Of the overall decline in CBR, changes in age-sex structure and percentage married accounted for 7%; change in marital fertility, for 93%.
Hong Kong **1961-71**	Mauldin et al. 1978 (166)	CBR declined by 45%, from 35.5 to 19.7. Of this decline, change in percentage married accounts for 24%; change in marital fertility, for 50%; and change in age structure, for 26%.
Indonesia (Java-Bali) **1967/71-1976**	Hull et al. 1977 (104)	TFR declined by 15%, from 5.3 to 4.5. Of this decline, change in percentage married accounts for 25.2%; change in marital fertility, for 74.8%.
Japan **1960-1970**	Cho & Retherford 1973 (43)	CBR increased by 9.3%, from 17.2 to 18.8. Of the increase, change in percentage married accounts for 12.9%; change in marital fertility, for 43%; and change in age-sex structure, for 44%.
Korea, Rep. of **1960-1970**	Cho & Retherford 1973 (43)	CBR declined by 33%, from 43.3 to 29.0. Of this decline, change in percentage married age 15-24 accounts for 35%; change in marital fertility, for 59.5%; change in age-sex structure for 5.6%.
Korea, Rep. of **1966-1970**	Retherford & Ogawa 1978 (339)	Modified decomposition technique compares effects of education and rural-urban residence as well as nuptiality on TFR. TFR declined from 4.837 to 4.257. Of this decline, changes in residence, education, and marital status account for 25%; changes in age-specific birthrates account for 75%.
Korea, Rep. of **1930-1975**	Coale et al. 1979 (312)	Decomposition techniques modified by use of indexes for overall fertility, for marital fertility, and for percent currently married. From 1930 to 1960, the total fertility rate declined slightly from 6.09 to 5.98. Measured by indices, a 21% decrease in percentage married offset a 24% increase in marital fertility. From 1960 to 1975 the total fertility rate declined from 5.98 to 3.140. Of this decline, change in marital fertility accounted for 74%.
Malaysia, West **1960-1969**	Cho & Retherford 1973 (43)	CBR declined by 19%, from 42.9 to 34.6. Of this decline, change in percentage married accounts for 67%; change in marital fertility, for 28%; and change in age structure, for 5%. Change in percentage married accounts for most of decline in CBR among Malays and Indians. Among Chinese, changes in age structure offset the decline in CBR caused by changes in percentage married and marital fertility.
Philippines **1960-1968**	Cho & Retherford 1973 (43)	CBR declined by 4.4%, from 40.4 to 38.6. If 1960 age structure and marital fertility had prevailed in 1968, the change in percentage married would have accounted for 102% of the change in CBR. However, change in age structure, given 1960 percentage married and marital fertility, would have increased the CBR by 1.2 points. Change in marital fertility, given 1960 age structure and percentage married, accounts for 65% of the decline in CBR or a decrease of 1.2 points.
Sri Lanka **1963-1971**	Fernando 1976 (79)	CBR declined by 11%, from 34.4 to 30.1. If 1963 age structure and marital fertility had prevailed in 1971, the change in percent married would have accounted for 100% of the decline in CBR. However, changes in age structure, given 1963 percentage married and marital fertility, would have increased the CBR by 1.6 points. Of the overall decline in CBR, changes in age structure and percentage married account for 63%; change in marital fertility, for 37%.
Taiwan **1960-1970**	Cho & Retherford 1973 (43)	CBR declined by 33%, from 38.7 to 27.1. Of this decline, change in percentage married accounts for 23%; change in marital fertility, especially in older age groups, accounts for 63%; and change in age structure, for 13%.
Taiwan **1961-1970**	Freedman et al. 1973 (319)	CBR declined by 28%, from 37.7 to 27.2. Change in percentage married accounts for 21% of this decline; change in marital fertility, 61%; and change in age structure, 12%. Interaction among all factors accounts for 6% of the decline.
Taiwan **1961-1976**	Sun et al. 1978 (237)	CBR declined by 31%, from 37.7 to 25.9. If 1961 age structure and marital fertility had prevailed in 1976, the change in percentage married would have lowered the CBR to 33. Change in marital fertility, given 1961 age structure and percentage married, would have lowered the CBR to 28.7 and accounted for 76% of the decline, while changes in percentage married and age-sex structure together would have accounted for 7% of the decline. Interaction among all factors accounts for 17% of decline.
Thailand **1964/65-1974/75**	Mauldin et al. (166)	CBR declined by 12%, from 42.2 to 37.0. If 1964-1965 age structure and percentage married had prevailed in 1974-1975, the changes in marital fertility would have lowered the CBR by 5.4 points and accounted for 103% of the overall decline. Changes in age structure, given 1964-1965 percentage married and marital fertility, would have produced an increase in the CBR of 1.2 points.

CBR = crude birthrate

*Decomposition techniques break down, or "decompose," total recorded changes in fertility into two or three components: (1) changes in the percent married, due primarily to changes in age of marriage (widowhood, divorce, and separation also have some effect); (2) changes in marital fertility; (3) changes in age-sex structure. The contribution of each component to the total change is estimated by determining the effect that the change in one factor would have had if the other factors had not changed during the period under consideration. These techniques always assume no fertility outside of marriage and sometimes do not allow for any interaction among variables. For example, if changes in age at marriage produce higher fertility in later years, this will be attributed not to previous changes in age at marriage, but to marital fertility.

Table 5. Contributions to Declines in Fertility by Women of Various Age Groups in Selected Countries of Asia

Country	Source Code	Years	Total Fertility Rates (TFRs)	Decline in TFR	% of Decline Attributable to Women Age 15-19	20-24	25-34	35-49	All ages
EAST ASIA									
Hong Kong	F8, F9	1965-1970	4.9–3.5	1.4	8	34	44	14	100
	F9, F11	1970-1975	3.5–2.8	.7	0	22	49	28	100
	F8, F11	1965-1978	4.9–2.8	2.1	5	30	46	19	100
Korea, Rep. of	F23, F23B	1960/61-1970	6.3–4.5	1.8	6	18	19	56	100
	F23B, F25	1970-1975	4.5–3.7	.8	1	4	72	23	100
	F23, F25	1960/61-1975	6.3–3.7	2.0	*	17	56	28	100
Taiwan	F50, F51	1965-1975	4.8–2.8	2.0	*	17	56	28	100
SOUTHEAST ASIA									
Indonesia	F15, F16	1967/70-1971/75	5.6–5.2	.4	26	4	32	38	100
Java-Bali	F19, F20A	1966/70-1976	5.4– 4.5†	.9	18	*	43	40	100
	F17, F20A	1967/70-1976	5.3– 4.5†	.8	17	0	46	37	100
Malaysia, West	F26, F27	1960-1965	6.1–5.6	.5	40	14	32	14	100
	F27, F28	1965-1970	5.6–5.1	.5	19	23	36	22	100
	F28, F32	1970-1975	5.1–4.2	.9	6	28	46	20	100
	F26, F32	1960-1975	6.1–4.2	1.9	19	23	39	19	100
Philippines	F35, F36	1963/67-1968/72	6.3–5.9	.4	22	33	25	20	100
Singapore	F41, F42	1965-1970	4.7–3.1	1.6	3	27	40	30	100
	F42, F45	1970-1977	3.1–1.9	1.2	6	17	45	32	100
	F41, F45	1965-1977	4.7–1.9	2.8	4	23	42	30	100
Thailand	F54, F57	1965/69-1970/74	6.2–4.9	1.3	0	11	54	36	100
INDIAN SUBCONTINENT									
India	F13, F14	1968/69-1971/72	5.7–5.3	.4	20	*	28	55	100
Sri Lanka	F46, F47	1953-1963	5.9–5.1	.8	15	35	47	3	100
	F47, F48	1963-1971	5.1–4.2	.9	6	30	52	13	100
	F48, F49	1971-1974	4.2–3.3	.9	7	18	66	9	100
	F46, F49	1953-1974	5.9–3.3	2.6	9	28	55	8	100

Note: Table includes only countries with available data with declines in total fertility rate exceeding 0.3. Of 12 countries with reliable data, 10 experienced decreases greater than 0.3, and 2 experienced decreases of less than 0.3 or no change. For age-specific fertility rates in these countries, see Table A5, p. M-153.

*Fertility in this age group increased; see Table A5, p. M-153.
†Alternative estimates presented.

Fewer early births, whether achieved by late marriage or by contraceptive use, have had impacts of differing importance on declines in total fertility. They have played important roles in certain countries in certain time periods. Close to 40 percent of the overall decline in fertility rates occurred among women 15-24 in West Malaysia from 1960 to 1970, in Sri Lanka from 1953 to 1971, and in Hong Kong from 1965 to 1970 (see Table 4). In these countries the decline attributable to women age 35 or older during those periods was much lower. Declining fertility among young women also accounted for substantial proportions of the total fertility decline in Hong Kong from 1970 to 1975, in Singapore from 1965 to 1975, and in Indonesia from 1967 to 1975. Fertility among older women in these countries also fell substantially in these periods. By contrast, declines in fertility rates among younger women were of little importance in reducing overall fertility in Thailand from 1965 to 1974, in Taiwan from 1965 to 1975, and in South Korea from 1970 to 1975.

In East Asia, later marriage and fewer early births were most important in the initial years of the transition to low fertility, but less important in later years when more of the total fertility decline was attributable to lower fertility among older women.

In Asian countries where total fertility has dropped appreciably, the fertility rate of each 5-year age group, as a proportion of the total fertility rate, has remained about the same. In other words, the *rates* of fertility decline have been roughly equal in all age groups, even though the absolute declines among older women have been larger. If anything, the relative contribution of women under age 25 to the total fertility rate has increased somewhat in a majority of these countries from the 1960s to the 1970s. That is, fertility has declined at a slightly slower rate among young women than among older women. This is the case in India, Indonesia, Japan, South Korea, Singapore, Taiwan, and Thailand. By contrast, in Bangladesh, Hong Kong, Malaysia, the Philippines, and Sri Lanka fertility declined somewhat faster among younger women than among older women. (See Table A5, p. M-153–154.)

Influences on Age at Marriage

In Asia, as elsewhere in the world, trends toward later marriage and lower fertility have occurred in a context of urbanization and economic and social development. The social conditions that have provided the incentive to control fertility have also provided the incentive to delay marriage.

The association with age at marriage of urbanization, female school enrollment, and female economic activity at age 20-24 is moderately close. In the four countries of Asia with high rates (that is, above the regional medians) for all three socioeconomic factors — Japan, Hong Kong, Singapore, and South Korea — 3 percent of women age 15-19 are or have been married. In the four countries with low rates for all three factors — Bangladesh, Indonesia, India, and Nepal — 57 percent are married. In the four countries where some socioeconomic rates are high and some low — West Malaysia, the Philippines, Sri Lanka, and Thailand — 11 percent are married. The three socioeconomic factors are interrelated to such a degree that it is not possible to single out one as more important than others in its relationship with age at marriage.

These three socioeconomic factors and age at marriage are, individually and as a group, related to total fertility rates. In the four Asian countries with high socioeconomic rates and high age at marriage — Japan, Hong Kong, Singapore, and South Korea — the TFR is 2.6. In the four countries with low socioeconomic rates and low age at marriage — Indonesia, India, Bangladesh, and Nepal — the TFR is 6.0. The four countries where some rates are high and some low have intermediate fertility rates, averaging 4.3.

This analysis suggests that in Asia socioeconomic factors affecting women — urbanization, school enrollment, and economic activity — and age at marriage and total fertility are highly interrelated. This does not mean, however, that all countries have arrived at their current marriage and fertility patterns in the same way. A closer look at trends in Korea and Sri Lanka reveals the different paths the two Asian countries have traveled to arrive at both a higher age at marriage and lower fertility.

Korea

The Republic of Korea presents one of the most striking and best documented examples in all the developing world of a country where age at marriage has risen sharply and fertility has fallen sharply. Like 19th-century Ireland, Korea is a country that was deeply affected by a foreign military occupation and by extensive out-migration of young men. Unlike Ireland, however, Korea has implemented a successful family planning program, abortion is readily available, and marriage is almost universal. In Korea the impact of rising age at marriage has been reinforced, especially recently, by the effect of readily accessible methods of birth control.

Separating, or decomposing, the sharp decline in the crude birthrate from 43.3 to 29.0 between 1960 and 1970, Cho and Retherford attribute almost 35 percent of the decline to changes in the proportion of women married. They attribute almost 60 percent to changes in marital fertility. Changes in marital fertility occurred primarily among women age 30-39, while changes in fertility due to higher age at marriage occurred primarily in women age 20-25 (43).

Ansley Coale and colleagues reached similar conclusions in their decomposition of the change in the total fertility rate. Between 1960 and 1975, by their calculations, 26 percent of the nearly 50 percent drop in fertility was due to changing marital structure and 74 percent to changing marital fertility. Between 1930 and 1960, however, age at marriage rose and marital fertility increased. The two changes counteracted each other, and the total fertility rate in 1960, despite fluctuations caused by World War II and the Korean War, was virtually the same as in 1930 — about six (312). In other words, in the absence of family planning programs or available contraceptive services, increases in age at marriage did not reduce total fertility but did prevent it from rising.

Changes in age-specific fertility rates between 1960 and 1975 suggest the declining importance of age at marriage to fertility. In the first 10 years of this period, 24 percent of the decline in the total fertility rate occurred among women age 15-24, 19 percent was attributable to women age 25-34, and about 56 percent to women over age 34. More recently, as the national family planning program has grown and the age at marriage has risen more slowly as it reached higher levels, contributions to the fertility decline are beginning to come much more from women 25-34. Of the decline between 1970-1971 and 1975 only about 5 percent was attributable to women age 15-24, 72 percent to women age 25-34, and 23 percent to women over age 34 (see Table 5).

Reasons for Later Marriage

The rise in age at marriage in Korea can be traced to the beginning of the century. Traditionally, marriage of women was early and universal (144, 263). During the Japanese occupation (1910 to 1945), mean age at marriage for women rose slightly, from 16.6 in 1925 to 17.8 in 1940. After 1940 age at marriage increased more rapidly, from 17.8 in 1940 to 23.3 in 1970. By 1970, about 97 percent of women age 15-19 were single and at age 20-24 some 57 percent remained single. More than 99 percent marry eventually, however (144).

What were the factors responsible for this rising age at marriage? First, marriageable young men migrated both internally, from rural to urban areas, and to Japan and Manchuria (144). Later, World War II and the Korean War disrupted Korean society (144, 263). All able-bodied young men were conscripted during the Korean War, and mandatory 3-year military service in South Korea since then has continued to discourage early marriage.

Changes in education and employment also encouraged later marriage. Classical Confucian education was limited to upper-class men, but educational reforms in the late 19th century and the limited public education introduced by the Japanese spread primary education to some men of all social classes. After World War II, a new system based on that of the United States extended education to many more men and, for the first time, to women. Increases in education and in mean age at marriage of women almost always go hand in hand. In 1966 Korean women with no education married at an average age of 18.4; those with elementary education married at age 20.5; those with secondary education, at 22.4; and those attending college or university, at 24.4 (147).

At the same time, manufacturing jobs began to become available in the cities. The proportion of the population working in agriculture dropped from about 80 percent in 1930 to about 50 percent in 1970. Manufacturing provided some jobs for young, unmarried women (144, 263). In Korean society, for women nonagricultural work has not been considered compatible with marriage. In 1966, 32 percent of single women in urban areas were employed outside the family compared with only 8 percent of married women (147). This pattern is borne out in age-specific economic activity rates for women. In urban areas, nearly 40 percent of women 15-24 work, but only 18 percent do at ages 25-34 (263). The unmarried woman's income often goes to her family, so her parents encourage her to marry late in order that the family can continue to receive her support. The unmarried man must work long enough to be able to support his wife and children once he marries. Thus both women and men have economic reasons to marry late.

LATE MARRIAGE AND BIRTH CONTROL REDUCE CHINA'S BIRTHRATE

The People's Republic of China has probably put more emphasis on raising the age at marriage than any other government in the world — and with considerable success. For more than two decades Chinese policy has been to recommend that women delay marriage until their early to middle 20s and men, until their middle to late 20s. These norms have gradually been accepted, with only slight differences between urban and rural areas, and mean age at marriage in the People's Republic of China now appears to be above the recommended minimums. In 1976 and 1977, from 94 to 97 percent of men and women married at or after the recommended minimum age in Nanning (Guangsi province), in Xiam (Shensi province), and in Changsha (Hunan province). The lowest rate of compliance reported was 75 percent, in Guangdong province; this is probably typical of most of China (37, 38).

The current late age at marriage represents a dramatic and radical change from the traditions of prerevolutionary China, which included child marriages arranged by families. One of the first actions taken by the Chinese communist government upon coming to power was to amend the marriage laws and promulgate equal rights for men and women. The Marriage Law of 1950 raised the minimum legal age at marriage to 18 for women and 20 for men. The purpose of the law was set forth in the first article:

> The feudal marriage system based on arbitrary and compulsory arrangements and the supremacy of man over woman, and in disregard of the interests of the children, is abolished.
>
> The New-Democratic marriage system, which is based on the free choice of partners, on monogamy, on equal rights for both sexes, and on the protection of the lawful interests of women and children, is put into effect. (39)

At first, the rationale for later marriage was entirely that the energies of young people should be channeled into work. The *Barefoot Doctor's Manual*, the handbook of China's rural paramedical workers, comments:

> If the young people talk about love, marriage and having children at too early an age, their energies will be dissipated, affecting their work and their study. Furthermore, from the standpoint of physical development, most young people do not attain all-around maturity until after 25 years of age. Premature marriage and procreation are not beneficial for the young and succeeding generations. (281)

Only more recently has later marriage been recognized as a means of slowing population growth (37, 247).

In 1957, after extensive public debate, Chinese leaders decided not to amend the law to increase further the legal minimum age at marriage. They reached this decision partly because they recognized the limits of legal coercion and partly because they felt that the desired delays in marriage were contingent on implementing measures that would make marriage less essential to the welfare of individual women and men (247, 248).

So far the Chinese have been willing to accept what to Western eyes seems a puritanical, almost Malthusian, model of youthful industriousness, delayed marriage, and sexual abstinence before marriage comparable to that of the Irish in the last century (49). Premarital sex is reportedly uncommon; children born out of wedlock are virtually unheard of; and abortions for unmarried women, although available and encouraged, are rare (177, 220). In striking contrast with much of the rest of the world, in China there now seems to be little social pressure on men or women to prove themselves by being sexually active or highly fertile.

Because age-specific fertility rates and marriage rates for China are not available, it is not possible to quantify how much late marriage has contributed to falling total fertility rates. Nevertheless, it appears that China's birth planning program as a whole, which includes convenient access to a wide array of birth control methods and strong communal pressures for small families, has been exceptionally successful. In 30 years China's crude birthrate has declined from more than 40 to less than 20 per 1,000 — in fact, to 18.34 per 1,000, according to a recent official statement (35). Because of the large number of young women in China today, such a dramatic fall in the birthrate must indicate substantial declines in the fertility rates of younger women — much of which can be attributed to delays in marriage.

One-Child Family

For the future, Chinese leaders seem to be putting less emphasis on further postponing marriage and more emphasis on small families. A major government report on population issues, dated August 11, 1979, mentions "delayed marriage" only once: it recommends more publicity to make delayed marriage and planned births "a social habit" (35). The report is by Chen Muhua, China's only female Vice Premier and the Head of the Family Planning Leadership Group of the State Council. The major message of the report, which is one of the most forthright justifications for a policy of population limitation ever delivered by a Marxist leader, focuses on the need to encourage the "one-child family" (36, 37). All higher order births, that is, after the second child, are to be "resolutely prevented," and the new ideal will be the one-child rather than the two-child family. To achieve this goal, the government report calls for stronger party leadership on population issues, more publicity and education, new laws that include rewards and penalties, research and training in contraceptive sciences, and a strong organizational structure (35).

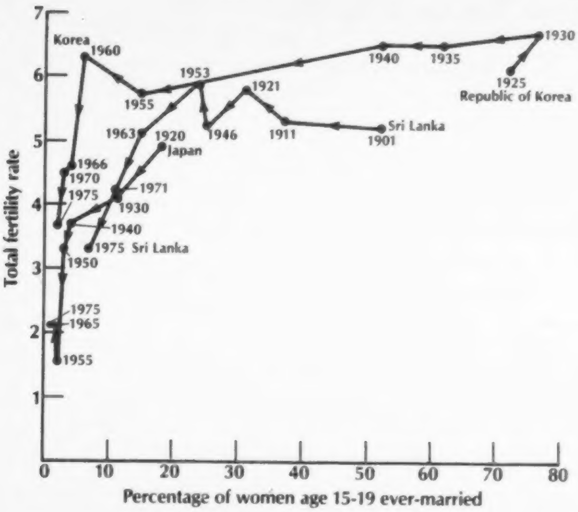
Chinese leaders may be recognizing that attempting to increase age at marriage beyond current levels would arouse public opposition and yield diminishing demographic returns (37). Demographers in China calculate that each year for the next decade or so about 23 million young men and women will reach the recommended ages of marriage (37). This means roughly 11 million marriages. If each couple has one child within about a year of marriage, 11 million births will occur each year, producing a birthrate of about 12. If each couple has a second child later, these births, added to first births to newly married couples, would approximately double the birthrate. Therefore further delay of marriage, while it could mean an entire generation less by the end of a century, will not have the same immediate demographic impact as eliminating all third-order births now and encouraging as many couples as possible to have only one child.

Sexual and Contraceptive Behavior in Korea

The fertility rate for women age 20-24 fell by almost 30 percent between 1960 and 1975 (see Table A5, p. M-153). How was this accomplished? Did all young women abstain from sexual activity while delaying marriage? Or has increased use of fertility control also helped to limit the fertility of unmarried as well as married women? Evidence is limited, but it suggests the latter.

In Korea, premarital childbearing is disparaged and rare, but premarital sexual activity is not rare and may be increasing. According to the Korean World Fertility Survey, 11 percent of women who had been married for five to nine years had their first children either before or within seven months after marrying. By comparison, women who had been married for 10 to 19 years reported only 6 percent of their first children were conceived premaritally (139). A combination of two effects may explain this difference: first, premarital sexual activity may be growing more common as the unmarried proportion of the population increases and, second, women who marry at older ages (and so have been married for fewer years) are more likely to have engaged in premarital sexual activity. Since birth control has become increasingly available over the past two decades and unmarried people are strongly motivated to prevent births, the increase in premarital conception rates presumably underestimates the increase in premarital sexual activity.

Figure 8. Trends in Total Fertility by Percentage of Women Age 15-19 Ever-Married in Three Asian Countries, 1901-1975



In Korea and Sri Lanka, the proportion of women ever-married at ages 15-19 had declined substantially well before marked declines in total fertility began. In Japan, the proportion ever-married at 15-19 was already low and a dramatic fertility decline under way by the date of the earliest available data. To read this figure, begin at the country name and earliest date shown (on the right-hand end of each line). The arrowheads show the direction of time. Movements from right to left show a decreasing percentage of women ever-married at 15-19, i.e., a rising age at marriage; movements from top to bottom show decreases in fertility. Thus in Korea, for example, the proportion married at age 15-19 dropped considerably between 1930 and 1955 (movement toward the left) while the total fertility rate declined by one (movement toward the bottom). Between 1960 and 1975, with age at marriage already high and contraceptive use spreading rapidly, the proportion married at age 15-19 declined only slightly, but the total fertility rate dropped sharply. Thus, for these countries the relationship between age at marriage and total fertility rate over time takes the form of an elbow curve.

Notes:
Total fertility rates are estimated from crude birthrates, on the basis of rates in similar countries, for Japan, 1920-1955 (crude birthrates are unadjusted); Sri Lanka, 1901-1946; South Korea, 1910-1955/1960.

Total fertility rates for South Korea are the average of the five years preceding and including the date reported, which is the date of the datum on percentage married age 15-19.

Japan: 1975 percentage ever-married at age 15-19 plotted against 1974 total fertility rate.
Sri Lanka: 1975 percentage ever-married at age 15-19 plotted against 1974 total fertility rate.
Korea: 1960 percentage ever-married at age 15-19 plotted against 1960-1961 total fertility rate. 1966 percentage married at age 15-19 plotted against 1965 total fertility rate.

Sources: Korea — Kwon et al. (144), Blayo (18); Sri Lanka (228), UN ESCAP (264), see also Table A3 in supplement, available on request; Japan — Blayo (18), Taeuber (241), see also Table A3 in supplement

Unmarried women may be turning increasingly to abortion to prevent births, indirect evidence suggests. Sung-bong Hong and Christopher Tietze estimated that in the city of Seoul in 1977-78 about 2,750 abortions would be performed for every 1,000 live births (101). Data from a 1971 survey yield an estimate of 750 per 1,000 (102). The difference, according to the researchers, may be due not only to increasing use of abortion, but also to the exclusion of unmarried women from the earlier study (101).

Contraceptive use among unmarried women has not been studied, but a substantial minority of young married women use or have used contraception. By 1973 an estimated 30 percent of currently married women age 20-24 were using a contraceptive method as compared with only 10 percent in 1964 (most using rhythm or withdrawal) (139, 263). Practice of rhythm and withdrawal has not diminished, and use of more effective methods has increased. In 1973, 20 percent of women with no living children reporting having used contraception at some time (139).

Increased sexual activity before marriage and increased abortion are characteristic of many countries where the age at marriage is over 20, including the United States. Korea is used as an example here because data are more complete and more accurate than data from most other developing countries. Overall, the major reason for low fertility in Korea today is the fact that more than half of ever-married women — 52 percent — have used effective modern methods of family planning — pills, IUDs, condoms, sterilization, and vaginal methods (139). In this context, a higher age at marriage means a smaller number of married women currently exposed to pregnancy and potential contraceptive failure and a shorter period of exposure.

Sri Lanka

In Sri Lanka, as in Korea, age at marriage has been rising since at least the turn of the century. A slow decline in fertility began in the early 1960s, and rising age at marriage seems to have played a part in lowering fertility (see Figures 7 and 8). Until 1971, age-specific fertility rates for women under age 25 dropped faster than those for older women. Some of this decline is due to later marriage, some to contraceptive use.

From 1921 to 1960, crude birthrates in Sri Lanka fluctuated between highs of 42 and lows of 34 while the singulate mean age at marriage remained quite high — over 20 — and increased to 22.1 in 1963. After 1960, the crude birthrate dropped gradually from the high 30s to the high 20s in 1973, while the singulate mean age at marriage increased somewhat more to 23.5 in 1971. In other words, in Sri Lanka, as in Korea, a relatively high age at marriage — over 20 — coexisted with a crude birthrate in the high 30s for several decades prior to 1960 (228).

Dallas Fernando, using a decomposition technique of analysis, calculated that all of the decline in the crude birthrate from 1963 to 1971 could be attributed to the reduction in the proportion married if marital fertility and the age-sex structure of the population had remained as they were in 1963. In fact, changes in the age structure counteracted some of the effects of changing marital structure. The net effect of these two contradictory trends accounts for 63 percent of the fertility decline while decreasing marital fertility accounts for the remaining 37 percent (80). (See Table 4.)

Age-specific fertility rates show that a substantial proportion of the drop in fertility since 1953 is attributable to women under age 25. Between 1953 and 1963 half the drop in total fertility was due to the lower fertility of these women, mostly accomplished by postponement of marriage and first birth. Their fertility declined by 22 percent. The drop in the fertility rate for women age 25 and older, a large proportion of whom were married, suggests that traditional birth control techniques were being used to some effect even before modern methods became available. (See Table 5 and Table A5, p. M-153.)

From 1963 to 1971 the fertility rate of women under age 25 dropped by 23 percent — virtually the same change as in the preceding decade. This decline, however, involving smaller absolute numbers, accounted for 36 percent of the total fertility decline. Also, larger declines occurred in older age groups between 1963 and 1971 than had between 1953 and 1963, perhaps reflecting the adoption of contraceptive methods by more married women.

National data used in analyses like these can mask wide variations within a country. In some districts of Sri Lanka marriage is late and fertility rates at all ages are low, while in other districts early marriage is common and fertility rates are high. And there are districts with intermediate rates, perhaps because two distinct cultural groups, adhering to their own marriage and fertility patterns, live in the same district (80, 228, 264, 298). The Sinhalese living in the coastal cities and the wet zone (the southwestern portion of the country) usually marry late and have relatively few children, often practicing rhythm or extended abstinence during marriage, while the Tamils, who live in the uplands, usually marry young and have many children, although some older Tamil women are now turning to sterilization. The Kandyan Sinhalese, who live in the valleys of the interior, often practice cross-cousin marriage and marry young, but when they marry outside the family they marry late (80, 228, 229, 264, 298). The cultural acceptance of late marriage has acted together with socioeconomic factors to produce a very late age at marriage for some cultural groups in Sri Lanka.

The socioeconomic factors encouraging late marriage have chiefly been shortages of good agricultural land (due to population growth), out-migration of young men, and inadequate employment opportunities for young men in tandem with increased educational opportunities for women. Agricultural employment has not grown as fast as the rural population, and the pressure on the land is evident: employment per acre on rice paddies rose from 139 in 1953 to 151 in 1971. Some 16 percent of men 20-24 were unemployed in 1963; 28 percent in 1971 (228). The increasing scarcity of jobs discourages men from setting up households. It also encourages men to migrate, both to the cities and to other countries, making early marriage more difficult (73). For every 100 women age 20-30, there are only 75 men age 25-34 (228). The economic situation for women is worse than that for men. In 1971 some 30 percent of the female labor force and 46 percent of women 20-24 in the labor force were unemployed (228). Educational facilities have expanded, however (73, 228), and education for young women, along with volunteer service work, has been the major substitute for early marriage, particularly among the Sinhalese (105) (see box, p. M-124).

The maturity of the bride and bridegroom in this South Indian wedding reflects their high social status. The majority of Indian women — almost 60 percent — marry before age 20. (United Nations/Rothstein)

While abstinence associated with late marriage has played a substantial role in reducing the fertility rates of young women, the considerable use of contraception by young married women suggests that birth control has also played an important role. In 1975, 30 percent of married women under age 25 had used contraception, as had 20 percent of married women with one child (229).

Conclusion: Asia

The delay in marriage and first birth has been an important part of the transition to lower birthrates in Asia. While recent declines in fertility are evident in all age groups, rises in age at marriage and first birth tended to precede reductions in the fertility of older women. This is especially true in countries where the social and economic conditions that provide incentives to limit reproduction arose before modern methods of contraception were available. When family planning programs, both private and public, were initiated in the 1960s, older women became the principal beneficiaries, finding modern contraceptive methods more acceptable and more effective than the traditional methods — abstinence, withdrawal, and abortion. Thus fertility among older women has fallen more rapidly in the last decade than fertility among younger women. Nevertheless, the numbers of younger women are now so large that even small reductions in their fertility rates can produce important reductions in the annual crude birthrate.

Contrasting Patterns Exist In Sri Lanka

While interviewing women in developing countries around the world, Perdita Huston heard a 31-year-old Sri Lanka woman, with a secondary education and engaged to be married, discuss her plans for childbearing.

How did you meet your fiancé?

He has no mother, no family. He has to prepare his meals and take them to his workplace. One of my friend's mother arranged it, thinking that he needed to be married. I have met him but I have not spoken. In groups, yes, but not alone. He hasn't come to my mother officially, but I think he is coming soon. I have asked several people; they say he doesn't take liquor. I think I like him very much.

Do you have any idea how many children you would like to have, once married?

Three or four.

Why not more?

If we have enough money, it doesn't matter having more children. My fiancé has a steady income but we do not have property. We have nothing to back us. We have only our daily wages. That is all we can earn. If we were very well off, we would have lots of property, we could afford more children. But with the present situation, we can't have more than three or four because the children would have to suffer. I want to educate them well. I want them to have good jobs. I want to look after them well and see that they are provided for. We would have too little time to give them attention and love if there were many more. (105)

* * * * * *

For a 45-year-old woman who had worked as a tea plucker on a plantation since she was 10 years old, a woman's life still seems very hard.

How old were you when you had your first child?

I attained puberty when I was 12, so I was married at 12. My parents arranged the marriage. I did not know my husband before. I was 13 when my first baby came.

Can you tell me how you think your life is different from your mother's or your grandmother's life?

My mother had just three children. I have a younger sister and an elder brother. As a child I was all right, but now I find it extremely difficult to live because I have such a large family — eight children. That's the main difference.

What do you think is a good family size in today's times? What is the best number of children per family?

If people have more than three, they will find it extremely difficult to make out.

And what are you telling your daughters about having smaller families?

I won't say anything to them. I am a poor example, myself. And then, having a child is so good.

And now a silly question. Did you ever think that it might have been better to have been born a boy?

Oh yes, I have thought of it several times. If I had been born a male I wouldn't have to go through all this agony of bearing so many children and have all these difficult problems to face. I think if I were a man I wouldn't have as many problems. (105)

MIDDLE EAST

In the Muslim Middle East, bounded by Pakistan on the east, Turkey on the north, the Sudan on the south, and Morocco and Western Sahara on the west, early arranged marriage remains common, part of the Islamic tradition of secluding women, or *purdah*. In this region, 18 countries have data on age at marriage and 20 on total fertility (see Table 6). These countries occupy an intermediate position between the late marriage–low fertility pattern that prevails in East Asia and the early marriage – high fertility pattern of the Indian subcontinent. As in Asia, fertility rates are higher where early marriage is most common and lower where marriage is delayed, but the relationship is less pronounced than in Asia (see Figure 9). In general fertility rates are high throughout the region — close to or above 5 — even where women marry relatively late. Decreasing fertility among older women has had more impact on total fertility rates than the decrease in fertility among younger women which might be attributed to rising age at marriage. The sole exception is Bahrain, where lower fertility among women under 25 has accounted for almost half of the fertility decline.

Prevalence of Early Marriage

The average percentage of women age 15-19 who are married in the 18 Middle East countries with data available is 34. The fertility rate for women 15-19 is correspondingly high — 99 per 1,000 women. The total fertility rate is also high, averaging 6.1 for women in 20 countries. (See Table 6.) It is slightly lower if Libya and the Sudan, where the latest available data are pre-1960, are excluded.

The range of percentage married at young ages varies widely in the Middle East. Early marriage reportedly is least common in Tunisia, with only 6 percent of 15-19 year olds reported married in 1975; Lebanon, with 13 percent in 1970; and Turkey, with 22 percent in 1975. Total fertility rates in two of these countries are the lowest in the region — 4.9 in both Lebanon (1970) and Turkey (1973). While the fertility rate in Tunisia of 5.8 (1976) is considerably higher, it nonetheless ranks fifth (see Table 6). Early marriage was most common in Libya with 72 percent of 15-19 year old women married in 1964, Western Sahara with 61 percent in 1970, and Afghanistan with 52 percent in 1972-1974. Only rough estimates are available, but total fertility was probably 7 or more in these countries (203, 259).

A tenuous relationship between early marriage rates and total fertility can be seen in Figure 9 by comparing the countries at one end of the range of rates of early marriage to those at the other end of the range. In the eight countries where the percentage married at age 15-19 is equal to or less than the regional median of 32 percent, the total fertility rate averages almost 6.

←

This and subsequent interviews with women in developing countries are excerpted from *Message from the Village*, by Perdita Huston (New York, Epoch B Foundation, 1978). Copies of the book can be obtained by writing: Office of Public Information, United Nations Fund for Population Activities, 485 Lexington Avenue, New York, New York 10017, USA. (Price: $3.95 (US); make checks payable to Epoch B Foundation.)

Table 6. Marriage, Fertility, and Socioconomic Factors, Most Recent Available Data, Middle East

Country	Year	% Females Age 15-19 Ever-Married	Rank Order	Source Code[a]	Year	ASFR Age 15-19	Rank Order	TFR	Rank Order	Source Code[a]	Year	% Females in School at 1st & 2nd Levels[b]	Rank Order	Year	% Females Age 20-24 Economically Active[c]	Rank Order	% Urban[d]	Rank Order
Tunisia	1975	6	1	M94	1976	65	4	5.8	5	F89	1976	45	9	1975	27	2	NA	
Lebanon	1970	13	2	M81	1970	NA		4.9	1	F76	1972	74	2	1970	24	3	58	1
Turkey	1975	22	3	M95D	1973	64	3	4.9	1	F91	1974	55	7	1975	46	1	39	6
Syria	1970	28	4	M90	1970	83	7	7.7	15	F86	1976	62	5	1975	24	3	44	3
Bahrain	1971	29	6	M71	1976	77	6	5.2	3	F64		NA		1971	12	10	NA	
Kuwait	1975	28	5	M80A	1975	128	11	7.2	11	F75	1975	67	3	1975	15	8	22	11
Egypt	1966	30	7	M72	1973	24	1	5.2	3	F66	1975	44	10	1975	12	10	35	8
Jordan	1972	30	7	M78	1976	57	2	6.5	7	F72	1976	63	4	1976	23	5	NA	
Iraq	1965	32	9	M76	1974-75	129[e]	12	6.9	10	F69	1976	50	8	1975	5[f]	14	51	2
Iran	1976	34	10	M74	1973-76	134	13	6.3	6	F68	1976	56	6	1972	10	12	41	5
Morocco	1971	34	10	M83	1973	74	5	7.4	14	F79	1975	27	12	1973	14	9	12	12
Pakistan	1975	38	12	M87	1974-75	119	9	7.2	11	F82	1975	19	14	1977	7	13	28	9
Sudan	1973	43	13	M88	1958	179	15	6.8	8	F85	1976	20	13	1973	18	7	44	3
Algeria	1966	47	14	M69	1969-71	102	8	7.2	11	F62	1975	44	10	1975	4[g]	16	39	6
Yemen Arab Rep.	1975	50	15	M97		NA		NA			1975	3	16	1975	5[f]	14	NA	
Afghanistan	1972-74	52[h]	16	M68	1972-73	137	14	7.7	15	F60	1976	5	15	1975	21[f]	6	10	13
Western Sahara	1970	61	17	M96		NA		NA				NA			NA		NA	
Libya	1964	72	18	M82	1959	119	9	6.8	8	F77	1976	103	1	1973	7		28	9
Oman		NA			1975	NA		7.3		F80		NA			NA		5	14
Qatar		NA			1975	NA		7.2		F83		NA			NA		NA	
Saudi Arabia		NA			1970-75	NA		7.2		F84	1975	24			6[f]		NA	
Yemen, People's Democratic Rep.		NA			1973	NA		6.1		F92	1974	30			5[f]		NA	
All countries																		
Unweighted mean		37				99		6.6				44			15		33	
Weighted mean[i]		34				99		6.1				36			16		34	

NA = not available.

[a] Codes refer to source information listed in Table A-6 of supplement, available on request.

[b] Source: UNESCO (267), Table 1. The gross school enrollment ratio at the first and second levels is the total enrollment of pupils of all ages at those two levels divided by the population of official school ages for those two levels. For countries with nearly universal education of the school-age population at the first level, the gross enrollment ratio will exceed 100 if many pupils are older than the official school ages. Second-level schooling includes general education, teacher training, and other secondary-level vocational-technical training. All ratios are expressed as percentages.

[c] Source: International Labour Office (121) Table 1A, or (122) Table 1 unless otherwise noted. Economically active population defined as employers, the self-employed, employees, unpaid family workers, members of producers' cooperatives, members of the armed forces, and unemployed persons with previous job experience.

[d] Source: 1970 data from World Bank (294). p. 510-513. Percentage of the population living in urban areas, generally defined as cities and towns; national definitions vary.

[e] As of 1965

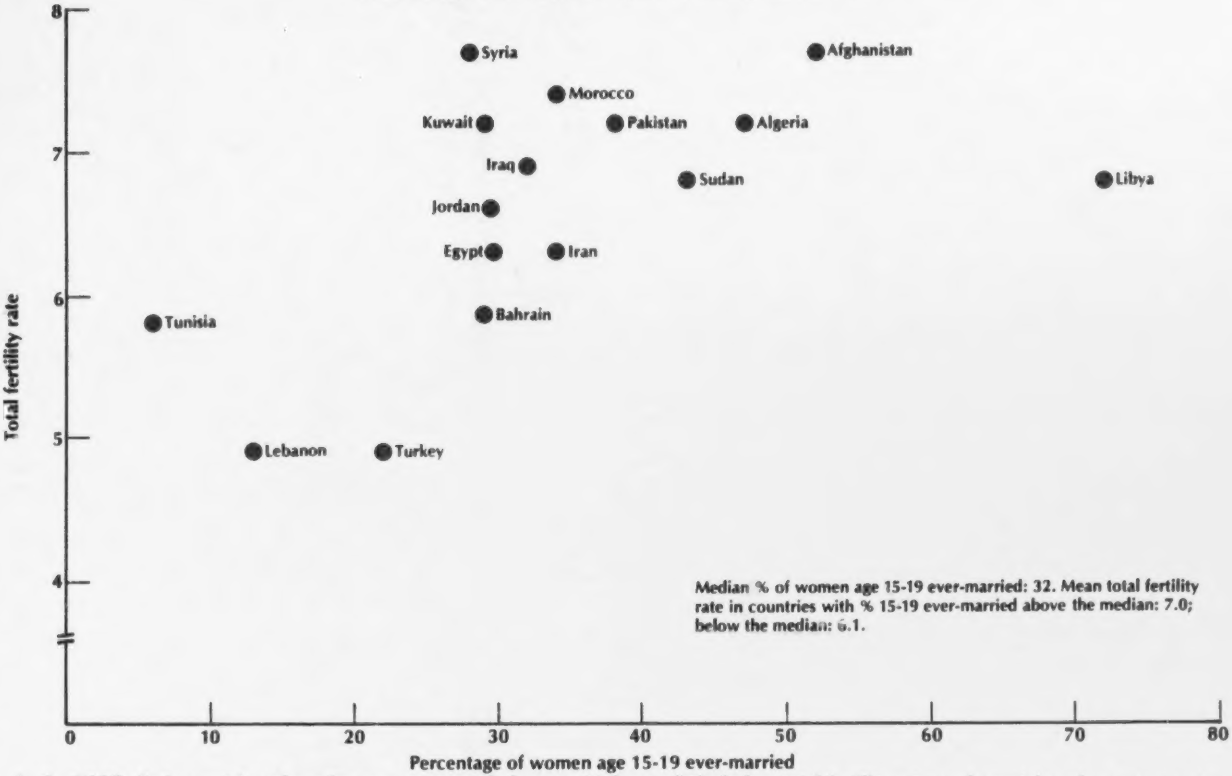
[f] Source: International Labour Office (122) Special Table. ILO projection for midyear 1975.

[g] Excludes 1.2 million women in agriculture.

[h] Rural population only

[i] Mean weighted by 1975 population as reported in US Bureau of the Census (280).

Figure 9. Fertility Rate by Percentage of Women Age 15-19 Ever-Married, Most Recent Available Comparable Data, Middle East



Median % of women age 15-19 ever-married: 32. Mean total fertility rate in countries with % 15-19 ever-married above the median: 7.0; below the median: 6.1.

In the Middle East, countries where few women marry before age 20 have relatively low total fertility rates and countries where many marry before age 20 have high fertility rates. Where the proportion marrying before age 20 is moderate for the region (between 25 and 40 percent), fertility rates vary considerably.

In the eight countries above the median, it averages almost 7. The relationship is fairly consistent. The major exception, Syria, has a relatively low percentage married at 15-19 years but a high total fertility rate. In general, moderate levels of early marriage coexist with a wide range of total fertility rates. For example, there are nine countries with 25-40 percent of women 15-19 ever-married, and total fertility in those nine countries ranges from 5.2 to 7.7.

Trends in Age at Marriage and Fertility

Age at marriage has risen recently in 8 of the 11 Middle East countries for which trend data are available (see Figure 10). These increases have not always been associated with decreases in total fertility, however. Age-specific fertility rates are available for six of the eight countries — Bahrain, Kuwait, Morocco, Pakistan, Tunisia, and Turkey (see Table A7, p. M-154), and in five of the six slight decreases in the fertility of 15-19 year olds confirm the increase in age at marriage (see Table 7 and A7). Tunisian data show a considerable increase in age at marriage from 1971 to 1976, but paradoxically also an increase in the fertility of 15-19 year olds. Questions have been raised about the accuracy of the age at marriage data (see p. M-129). Recent data on age at marriage are not available for Egypt or Iraq, but no substantial increase took place in the 1960s. In Jordan age at marriage did not change through 1972.

In the eight countries with reported increases in age at marriage, trends in total fertility have been mixed. Of the five countries with reliable data, total fertility has declined in Bahrain, Iran, and Tunisia but has not changed much in Kuwait and Turkey. Of the three countries with less complete estimates of fertility, little change occurred in Syria through 1970 (259, 269) or in Pakistan through 1974-75 (8, 193), and in Morocco total fertility may have increased between 1960 and 1973.

In Egypt, although 30 percent of 15-19 year olds were married in 1966, early fertility rates were relatively low. Total fertility in Egypt declined between 1966 and 1972, when the crude birthrate reached a low of about 34 per 1,000. In 1979, however, the government announced that the crude birthrate had risen in 1978 to 38.7 (32). Some of the increase may be due to improved registration. Recent changes in age at marriage are not known.

There are only four countries where it is possible to estimate the contribution of postponed marriage to declining fertility rates by comparing changes in age-specific fertility rates among younger women to changes in fertility rates among older women. In three of the countries, Egypt, Tunisia, and Turkey, declining fertility among younger women has not been responsible for most of the drop in the total fertility rate. In Egypt up to 1972, change among women under 25 accounted for about 20 percent of the decline in the total fertility rate and among women over 35 for about 25 percent of the decline, with 56 percent attributable to women in the middle range of 25-34. In Turkey, 28 percent of the decline in total fertility was due to the drop in fertility among women under 25, but 72 percent of the decline was among women over 35 (see Table 7).

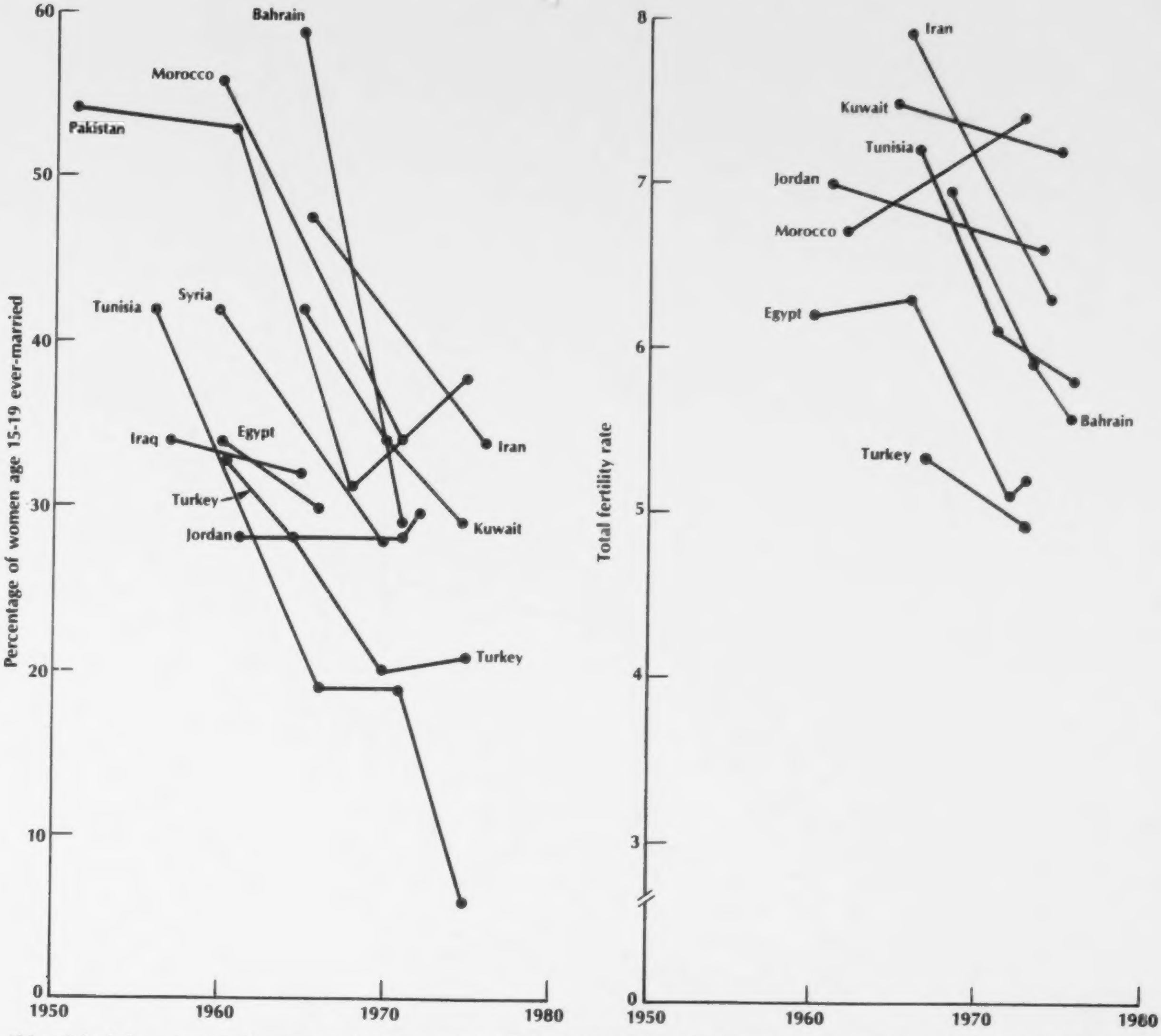
In Bahrain, declining fertility among younger women has been responsible for most of the decline in overall fertility between 1965-1971 and 1971-1976; around 16 percent of the decline occurred among the youngest age group and 42 percent among women age 20-24, or a total of 58 percent among women under 25. Some of this decline is directly due to higher age at marriage. In 1965, 59 percent of women 15-19 and 94 percent of women 20-24 were married, figures that dropped to 29 percent and 83 percent, respectively, in 1971. A marriage squeeze, caused by extremely high birthrates before 1970, the custom of men marrying women 5 to 10 years younger than they, and out-migration of men, may have been a major cause of delay in marriage (63). Although school enrollment for women 15-19 has increased by more than 50 percent since 1965, very few Bahraini women are employed outside their households (63, 260).

Even in countries where early marriage is becoming less common, there has been considerable resistance to reform of marriage customs. Iran and Tunisia are among the countries where age at marriage clearly has been rising and birth control is more widely used, especially in the cities. The governments of both countries during the 1960s and 1970s tended to encourage later marriage, partly to encourage lower fertility and partly to promote social reforms for women. Some opposition, especially religious, has developed in both countries with, in Tunisia, some diluting of government support for improving the status of women and, in Iran, a halt to government support of marriage reform, family planning, and improved conditions for women.

Iran

In 1975, Iran's Family Protection Act changed the minimum legal age at marriage for women with parental consent from 15 to 18 (194). Exceptions were readily granted to women over 15, however, and in rural areas marriages were not always registered, which limited the effectiveness of the law (194). Iranian laws and customs have always been interwoven with the *sharia*, or Islamic law, so this and other changes attempted by Shah Reza Pahlevi offended orthodox religious leaders. In February 1979, a coalition supporting one of these leaders, the Ayatollah Khomeini, overthrew the government of the Shah. The Family Protection Act was denounced, leaving age at marriage largely dependent on Muslim traditional law and local

Figure 10. Trends in Early Marriage and Total Fertility, Middle East, 1951-1976



Although both the proportion of women age 15-19 ever-married (left) and total fertility (right) have declined at rapid rates in the Middle East over the past 15 years, neither has yet reached a low level. The exception is the proportion married reported in Tunisia.

Table 7. Contributions to Declines in Fertility by Women of Various Age Groups in Selected Countries of the Middle East

Country	Source Code	Years	Total Fertility Rates (TFRs)	Decline in TFR	% of Decline Attributable to Women Aged 15-19	20-24	25-34	35-49	All ages
Bahrain	F62, F63	1965/71-1971/76	6.9−5.9	1.0	18	39	24	19	100
	F63, F64	1971/76-1976	5.9−5.5	0.4	11	51	35	4	100
	F62, F64	1965/71-1976	6.9−5.5	1.4	16	42	27	15	100
Egypt	F65, F66	1966-1973	6.3−5.2	1.1	5	15	56	25	100
Tunisia	F87, F88	1966-1971	7.3–6.1	1.1	17	20	34	29	100
	F88, F89	1971-1976	6.1–5.8	.3	*	18	31	50	100
	F87, F89	1966-1976	7.3–5.8	1.5	5	21	36	38	100
Turkey	F90, F91	1966/67-1973	5.3−4.9	.4	22	6	0	72	100

Note: Table includes only countries with available data experiencing declines in total fertility exceeding 0.3. Of 6 countries with reliable data, 4 experienced decreases greater than 0.3; 1 experienced no change; and 1 experienced an increase. For age-specific fertility rates in these countries, see Table A7, p. M-154.

*Fertility in this age group increased; see Table A7, p. M-154.

customs (1). Even during the Shah's rule, the conflict between traditional Islamic forces and those interested in modernization had limited the influence of the Family Protection laws (170).

The social pressures that continue to promote early marriage in Iran are typical of the Middle East. Families perceive economic advantages in marrying off daughters at young ages; Islamic teachings encourage early marriage; the high value ascribed to female chastity means finding a suitable match for a girl soon after she reaches sexual maturity; dowry (bride price) is higher for younger women because Muslim men as a general rule consider younger women more sexually attractive and because younger women have higher potential fertility ahead of them (170). Although some young couples establish their own homes, many live with the husband's family; young girls are preferred because they can be more easily incorporated into the household. Cross-cousin marriages are favored and are arranged by families while the intended spouses are young. Sometimes daughters are married off in return for the promise to provide a girl from that family for the son (90, 170, 194, 289, 301, 302).

Except among the upper and middle classes in Tehran, the place of women in Iranian society leaves few alternatives to early marriage. Many Muslims believe that women should not come into contact with men who are not relatives. This belief leads kinsmen to limit severely the activities of women. The physical movement of women in rural areas and in the cities outside of Tehran was and is highly restricted. A woman walking alone on the streets may be touched, teased, and otherwise harassed. As a result, most women seldom venture from the house (194).

Oil revenues brought changes in the economic and social structure of Iran that encouraged later marriage and low fertility. The Shah and especially his twin sister Princess Ashraf and the Empress Farah worked actively to improve the status of women. Women were encouraged to attend school, including Tehran University. School enrollment rates for women rose about as much as men's enrollment rates. In 1965, 17 percent of women and 39 percent of men were enrolled in second-level schools (usually attended by those age 11-16); by 1976 these rates had risen to 35 percent and 61 percent, respectively (267). In early 1979, Khomeini suggested that coeducation be abolished. As a result male and female students had to attend segregated classes at Tehran University.

The practice of female seclusion has kept women's labor force participation levels low. Although in rural areas 20 percent of women were reportedly economically active in 1976, 69 percent of these were unpaid family workers or self-employed, mostly engaged in home industry, weaving rugs (124). In urban areas only 16 percent of women were classified as economically active, but slightly over half of them were professional or technical workers (124). As Nadia Youssef has put it, "Because in Middle Eastern societies the intermingling of the sexes is generally viewed with suspicion and, since the slightest doubts concerning the sex ethics of a woman compromise her entire family, male guardians prevent their women-folk from joining service-type organizations" (302). This rules out sales, clerical, administrative, and managerial jobs as well as domestic service and leaves women few career opportunities except teaching and nursing other women.

Traditional practices of female seclusion, supported by *mullah* (religious leaders) and the *sharia*, are more prevalent in rural areas than in urban areas, and this difference is reflected in age at marriage and fertility rates for 1976. In rural areas, 38 percent of women 15-19 were married, and the total fertility rate was 7.8. In urban areas, 30 percent of women 15-19 were married, and the total fertility rate was 4.4 (271). The prevalence of early marriage declined just as much in rural as in urban areas of Iran from 1966 to 1976, but total fertility fell much more in the urban areas, due mainly to greater use of contraceptives.

In urban areas, later marriage contributed somewhat to the decline in fertility between 1966 and 1976. Using the decomposition technique to analyze the fall in the urban crude birthrate from 42.3 in 1966 to 33.1 in 1976, Michael Roof estimates that decreases in the proportion of women age 15-49 who were married resulted in a drop in the crude birthrate of roughly 3.5 points. Decreases in marital fertility (and its interaction with other factors) would have caused a drop of roughly 8.4 points (211) (see Table 8 and Note in Table 4). This analysis assumes that there were no premarital conceptions, an assumption which may be more valid in Iran and the Middle East than it is elsewhere. Nevertheless, at a Tehran hospital in 1968, women age 15-19 were as well represented among those admitted for abortions as women in any older age group (125), even though a smaller proportion were married. This suggests that premarital conceptions are not unknown in Iran, so the importance of age at marriage in the urban fertility decline may be slightly exaggerated in a decomposition analysis.

Tunisia

Tunisia has been a leader among Arab nations in freeing women from the veil and encouraging family reform. Nevertheless, official support for changes in marriage laws has met resistance stemming from traditional Islamic beliefs and has occasionally slackened in response to these pressures. While the reported prevalence of early marriage has dropped to levels close to those of East Asia, the total fertility rate has declined only moderately and remains well above rates seen in East Asia.

Within five months after gaining independence in 1956, the National Assembly of Tunisia passed the Personal Status Code. Polygamy was abolished, repudiation of wives (automatic divorce initiated by a husband) was outlawed, and the legal minimum age of marriage for women was set at 15 and for men at 21. President Habib Bourguiba actively supported these reforms and in several speeches spoke against "the veil" and criticized those who felt that women should be kept in seclusion (149, 197, 243).

In 1964 the legal minimum age at marriage for women was raised to 17. The law has received wide publicity and appears to have had some effect. From 1965 to 1968, fewer than a thousand women under 17 married annually; approximately 10 times more women married at 17 than at all ages below 17 (73). In 1963 and 1964, however, just before the law went into effect, a large number of marriages were contracted — 20 percent more than in either 1962 or 1965 (256) — possibly to avoid noncompliance with the new law. More recent marriage registration data show that an increasing number of exceptions to the legal minimum have been granted. Marriages of women under age 17 constituted approximately 3 percent of all marriages in 1968 and 6 percent in 1973 (73, 256).

Census data on the prevalence of early marriage and early fertility show dramatic declines from 1956 to 1971 followed by a leveling or perhaps even a reversal of that trend. The reported proportion ever-married at age 15-19 dropped from 42 percent in 1956 to 19 percent in 1966 and 6 percent in 1975. No 1956 age-specific fertility rate is available, but in 1966 the rate for women age 15-19 was 78. It fell to 40 in 1971, but then rose to 67 in 1975, despite the continued decline in the reported percentage married. The 1975 figures imply a marital fertility rate of 1,113 births per 1,000 women, an impossibly high figure. Misreporting of age is probably the reason. Because of the marriage law, census takers and respondents may be inclined to overstate the ages of young married women, especially if they have children. If so, rise in age at marriage has probably been more gradual than the census estimates suggest.

What effect did the shift to later marriage have on overall fertility? The crude birthrate did not change between 1956 and 1966 (217). Any lower fertility among young women must have been counterbalanced by higher fertility among older women. (No age-specific rates are available from the 1956 census.) From 1966 to 1976, the total fertility rate fell from 7.2 to 5.8; the decline was almost evenly distributed among women age 15-24, women 25-34, and women 35-49 (see Table 7).

What factors account for the recent trends toward later marriage and lower total fertility? In the first 10 years after Tunisian independence, official support for marriage and family reform was accompanied by social and economic changes that prompted delay of marriage. Also, from 1968 to 1975, many young single men left the country to work elsewhere. As a result, in 1974 there were only 58 men age 25-29 for every 100 women age 20-24 (73). Many young women could find no men of suitable age to marry.

Another stimulus for change was the emphasis on expanding education for women. The rate of school enrollment for women at the first and second levels (usually attended by those age 6-18) rose from 27 percent in 1960 to 47 percent in 1970. By comparison, enrollment for men rose from 60 percent in 1960 to 79 percent in 1970.

President Bourguiba has been a strong supporter of women's role in a more modern society. Nevertheless, in 1969 he

Table 8. Selected Studies of the Components of Fertility Change in Middle Eastern Countries, Using Decomposition Techniques

Country and Period Studied	Author, Date, Reference No.	Observations and Conclusions
Iran **1966-1976**	Roof 1979 (211)	Overall CBR declined 13%%, from 48 to 42. Of this decline, change in percent unmarried accounts for 56%, change in age structure for 11%, and change in marital fertility and interaction of factors for 33%. Urban CBR declined 20%, from 42 to 33. Of this decline, change in marital fertility accounts for 93% while change in age structure and in percent married offset one another. Rural CBR declined 4%, from 52 to 50. If 1966 rural age structure and rural percentage married had prevailed in 1976, the change in rural marital fertility would have increased the rural CBR by 4%. However, change in rural age structure, given 1966 rural percentage married and rural marital fertility, would have lowered the rural CBR by 1%. Similarly, change in rural percentage married, given 1966 rural age structure and marital fertility, would have lowered the rural CBR by 7%. In summary, changing marital fertility was almost entirely responsible for the large drop in urban fertility; changing marriage patterns, while of no greater impact in rural areas than in the cities, accounted for the slight drop in rural fertility.
Tunisia* **1966-1975**	Tabutin 1979 (240)	CBR declined 23%, from 46.1 to 35.6. Of this decline, change in age structure accounts for 4.4%, combined change in age structure and in percentage married for 56%, and combined change in age structure and in marital fertility for 40%.
Turkey **1960-1975**	Ozbay et al. 1978 (327)	CBR declined 29%, from 45 to 32. Of this decline, change in percentage married accounts for 23%, change in marital fertility for 69%, and change in age structure for 8%.

*Tunisians and foreign residents

warned that too much reform would lead to "a loosening of our morals" and that freedom "must be coupled with religious and moral education in order to produce the respect for virtue that was formerly assured by long robes and heavy veils" (243).

Public attitudes toward the position of women seem to be ambivalent. In surveys of literate employed people in Tunis and three smaller towns, for example, the percentage answering "Yes" to the question, "Is it acceptable for a woman to direct a professional enterprise employing many men?", fell from 46 percent in 1967 to 32 percent in 1973. Other questions on women's position drew similar responses (243). The government has slowed its expansion of the educational system because it cannot provide jobs for all graduates and because the quality of education was diminishing with too rapid expansion (243). By 1977, school enrollment at the first and second levels had declined from 47 to 45 percent for women and from 79 to 70 percent for men (267).

In Tunisia Some New Freedoms for Women

An 18-year-old Tunisian woman from the town of Sfax described to Perdita Huston the differences between her own life and her mother's life:

Can you tell us about your mother's life and how it differs from yours?

The difference is that my mother was married off at a very young age. They put her into the hands of her husband and there she was. She had to obey everything. She had nothing. That was in colonial times. Now we are an independent country. We enjoy many freedoms that our mothers knew nothing about. Before, women only went out of the house to gather olives or work in the fields, and they were wrapped up in the traditional costume. Luckily now we have left that behind, and we have abandoned the veil.

How did you happen to come to this [rural job training] center?

My sister encouraged me to come here. She even registered me. It was my brother who opposed it. He kept me from coming for a long time because he is very suspicious. He doesn't want his sisters to be emancipated. My mother convinced him by saying this center was very isolated and that I wouldn't risk anything here. I would not be in danger. That was the most important argument. Then my sister and my mother registered me and told my father that it was a very good thing. They convinced him that I would learn a trade. He wanted me to be able to earn a living, and he always kept saying, "What will I do with you if you can't earn anything?"

If you were in a position to help women, what would you like to do for them?

One of the most important things to teach women is family planning. Teach them to have only two children so that they can educate them, dress them properly, give them everything they need. We must teach women how to help their husbands and help them carry the load of life together.

The young woman hesitated a moment, thought some more, looked up at us and continued:

One should educate the women who have remained closed up at home without any contacts with the outside. Teach them to educate their children. Teach them to never give a daughter to a man she doesn't know or doesn't love. That is the way to assure a good life, a better life, a better future for them. (105)

At the same time, Tunisia has undertaken the most comprehensive population/family planning program in the Middle East and Africa. Beginning from a pilot project in Bizerte in the 1960s, the program was extended nationwide, and in 1974 a semiautonomous government agency was established under the Ministry of Health. The government has legalized both abortion and sterilization, taken oral contraceptives off prescription, and encouraged door-to-door distribution of pills and condoms (201). Yet Tunisian officials remain sensitive to religious concerns, and the program is implemented largely in the context of health services.

Overall, Tunisia has seen rapid change, reflected in a substantial decline in reported early marriage (before age 20) and a moderate decline in total fertility.

AFRICA

The countries of sub-Saharan Africa (excluding North Africa, southern Africa, and islands off East Africa) have the highest levels of early childbearing of any region in the world, averaging more than 50 percent higher than other high fertility regions. Africa has about the same proportion of women married at age 15-19 as the Indian subcontinent but higher total fertility. Within the region there is little association between early marriage, early childbearing, and the total fertility of countries. While Africa ranks low in female school enrollment and urbanization, it has one of the highest proportions of economically active young women of any region, but neither outside employment nor higher levels of school enrollment appear as closely linked to lower fertility as they are in other parts of the world.

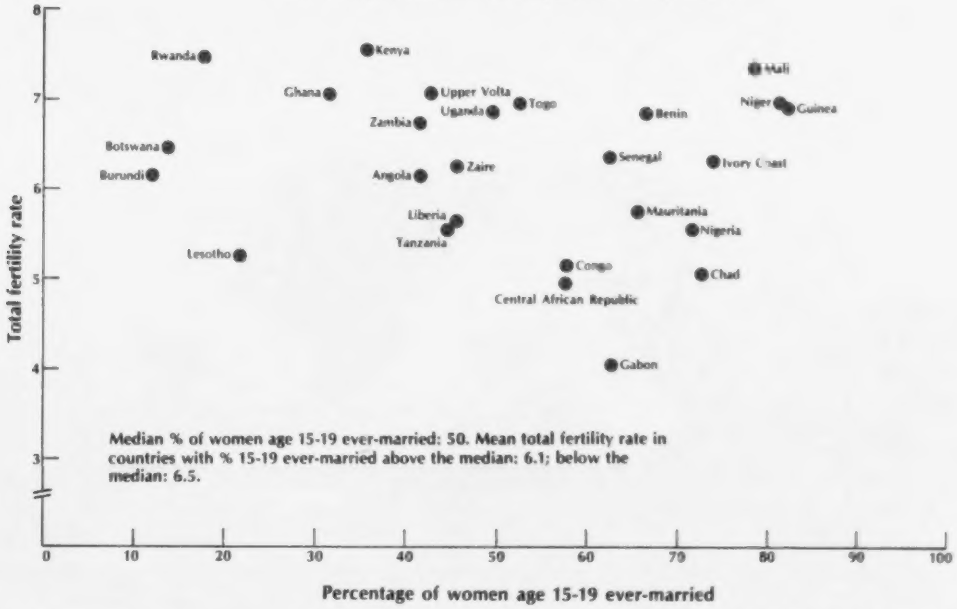
There are three reasons for these disparities. First, many of the African data are old and of poor quality. (More information from surveys now underway in Africa, including those under the auspices of the World Fertility Survey (134), may provide more extensive and up-to-date information.) Also, women frequently do not know their exact age and underreport both infant mortality and live births.

Second, the demographic transition is at an earlier stage in Africa than in most other regions. Mortality rates, especially infant mortality, are still high in many areas, and there is little evidence of declines in fertility. Data on trends in marriage and early childbearing are few.

Third, throughout Africa there is great local variation in marriage customs, which produces different fertility patterns even within the same country. Influencing these customs in parts of Africa are high rates of infant mortality and a high incidence of infertility and subfecundity. Polygamy often exists side by side with a high rate of widowhood, divorce, and remarriage.

Because of the considerable differences among countries and among areas, no one country was selected to exemplify Africa, as has been done for other regions in this report. Instead, data from various countries will be used to illustrate the relation-

Figure 11. Fertility Rate by Percentage of Women Age 15-19 Ever-Married, Most Recent Available Comparable Data, Africa



Median % of women age 15-19 ever-married: 50. Mean total fertility rate in countries with % 15-19 ever-married above the median: 6.1; below the median: 6.5.

In Africa, total fertility rates are moderate to high regardless of the proportion married at ages 15-19. No relationship is readily apparent.

ships that seem to exist among age at marriage, fertility, and socioeconomic factors under different conditions.

Prevalence of Early Marriage

In comparison with women from most other regions, African women marry young. According to the most recent available data from 28 countries, the average proportion married among women 15-19 was 55 percent (see Table 9), close to the 58 percent seen in the Indian subcontinent. Fertility rates among women 15-19 are also high, averaging 164 births annually per 1,000 women age 15-19 in 31 countries where data are available. These rates of early fertility are comparable to recent rates in some Muslim countries — Afghanistan, Bangladesh, and Iran — and in some Central American and Caribbean countries — Belize, El Salvador, Guatemala, Honduras, and St. Kitts-Nevis — and to rates in several other areas — Dominican Republic, Indonesia, and Panama — at the time when many of the African data were gathered.

Marriage is nearly universal in Africa (29, 284). While almost every woman marries at least once in her lifetime, the prevalence of early marriage varies widely from country to country and even from one area to another within African countries. Marriage close to the age at menarche is common in most Islamic areas — for instance, the Sahel states of Mali, Chad, Niger, Mauritania, and the northern region of Nigeria. In northern Nigeria, for example, the 1964-1965 Rural Demographic Sample Survey found that the median age at marriage for rural women was 14.8 years (175). In 1973, 43 percent of the women surveyed in Kano, a town in northern Nigeria, reported they had married before the age of 14, and 87 percent had married before age 20 (94). In Sokoto, a city founded in 1809 as headquarters for the Muslim Reform Movement, 94 percent of the women with no "western-style" education and 49 percent of the women who had been to the local girls' boarding school for "western-style" secondary education had married before age 16 (250).

Early marriage has been traditional for women in several other countries in Western Africa. Based on a 1969-1970 survey, the mean age at marriage in Sierra Leone, which is 79 percent Muslim, was 15.7 years (71). While there are no overall figures available for Gambia, John Caldwell and Barbara Thompson, who studied the Muslim village of Keneba in 1962, found that of the 51 females 10-14 years old in the village, 31 were betrothed; of the 32 females 15-19 years old, 24 were married, the rest betrothed. The researchers assert that "in many respects the findings in Keneba are fairly typical not only of Gambia but also of other large parts of West Africa" (30). Northern Cameroun is also a Muslim region, and there the usual age at first marriage in 1960-1961 was 14 or 15 (199).

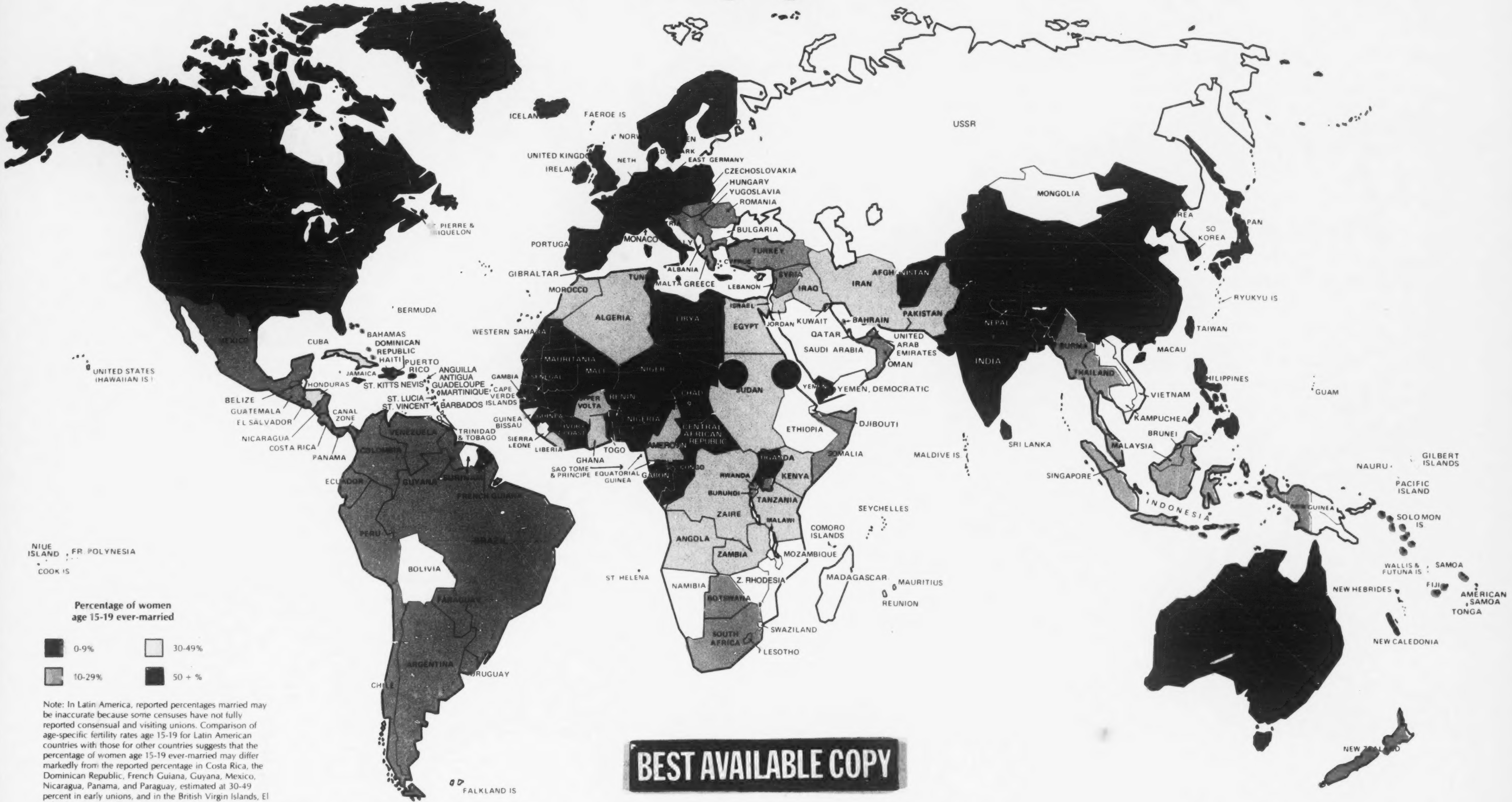
In general, early marriage may be less prevalent in East and Central Africa than in West Africa. The median age at marriage is at least 17 or the proportion of women married at age 15-19 is less than 50 percent in Angola, Botswana, Burundi, western Cameroun, Ghana, Kenya, Lesotho, Liberia, western Nigeria (189), Rwanda, Somalia, Tanzania, Upper Volta, Zaire, and Zambia (see Figure 11 and Table 9).

Total fertility rates are high in African countries, averaging 6.2 in the 33 countries for which estimates have been made. The average estimated total fertility rates appear to be slightly lower in Central Africa — 5.4 — than in East Africa — 6.7 — or in West Africa — 6.6. A combination of underreporting of live births and infertility associated with poor living conditions, rather than voluntary control over fertility, are probably responsible for lower total fertility such as that in Central Africa (29).

In areas where fertility is usually not controlled except by abstinence and breast-feeding, differences in the age at which sexual activity begins — roughly indicated by usual age at marriage — should have a noticeable effect on overall fertility. Indeed, it has been argued that variation in abstinence within marriage is one of the major factors accounting for variations in fertility in Africa (29), so differences in the length of abstinence preceding marriage could be expected to have an impact.

Prevalence of Early Marriage

Most Recently Reported Percentage of Women 15-19 Ever-Married


ICELAND
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NORWAY
UNITED KINGDOM
IRELAND
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DENMARK
EAST GERMANY
CZECHOSLOVAKIA
HUNGARY
YUGOSLAVIA
ROMANIA
BULGARIA
PORTUGAL
MONACO
ALBANIA
MALTA
GREECE
CYPRUS
TURKEY
SYRIA
LEBANON
IRAQ
IRAN
AFGHANISTAN
PAKISTAN
USSR
MONGOLIA
SO KOREA
JAPAN
RYUKYU IS
TAIWAN
MACAU
NEPAL
INDIA
BURMA
THAILAND
VIETNAM
KAMPUCHEA
PHILIPPINES
GUAM
SRI LANKA
MALDIVE IS
MALAYSIA
BRUNEI
SINGAPORE
INDONESIA
NEW GUINEA
NAURU
GILBERT ISLANDS
PACIFIC ISLAND
SOLOMON IS
WALLIS & FUTUNA IS
SAMOA
FIJI
AMERICAN SAMOA
TONGA
NEW HEBRIDES
NEW CALEDONIA
NEW ZEALAND
GIBRALTAR
MOROCCO
TUNISIA
ALGERIA
LIBYA
EGYPT
ISRAEL
JORDAN
KUWAIT
BAHRAIN
QATAR
SAUDI ARABIA
UNITED ARAB EMIRATES
OMAN
YEMEN
YEMEN, DEMOCRATIC
DJIBOUTI
ETHIOPIA
SOMALIA
SUDAN
CHAD
WESTERN SAHARA
MAURITANIA
MALI
NIGER
SENEGAL
GAMBIA
CAPE VERDE ISLANDS
GUINEA BISSAU
GUINEA
SIERRA LEONE
LIBERIA
IVORY COAST
UPPER VOLTA
GHANA
TOGO
BENIN
NIGERIA
CAMEROON
CENTRAL AFRICAN REPUBLIC
SAO TOME & PRINCIPE
EQUATORIAL GUINEA
GABON
CONGO
UGANDA
KENYA
RWANDA
BURUNDI
TANZANIA
ZAIRE
MALAWI
ANGOLA
ZAMBIA
MOZAMBIQUE
Z. RHODESIA
NAMIBIA
BOTSWANA
SOUTH AFRICA
SWAZILAND
LESOTHO
MADAGASCAR
COMORO ISLANDS
SEYCHELLES
MAURITIUS
REUNION
ST HELENA
PIERRE & MIQUELON
BERMUDA
BAHAMAS
CUBA
DOMINICAN REPUBLIC
HAITI
PUERTO RICO
JAMAICA
ANGUILLA
ANTIGUA
GUADELOUPE
MARTINIQUE
ST. KITTS NEVIS
ST. LUCIA
ST. VINCENT
BARBADOS
TRINIDAD & TOBAGO
MEXICO
UNITED STATES (HAWAIIAN IS)
BELIZE
GUATEMALA
HONDURAS
EL SALVADOR
NICARAGUA
COSTA RICA
CANAL ZONE
PANAMA
VENEZUELA
COLOMBIA
ECUADOR
GUYANA
SURINAM
FRENCH GUIANA
PERU
BRAZIL
BOLIVIA
PARAGUAY
CHILE
ARGENTINA
URUGUAY
FALKLAND IS
NIUE ISLAND
FR. POLYNESIA
COOK IS
Percentage of women age 15-19 ever-married
0-9%
30-49%
10-29%
50 + %

Note: In Latin America, reported percentages married may be inaccurate because some censuses have not fully reported consensual and visiting unions. Comparison of age-specific fertility rates age 15-19 for Latin American countries with those for other countries suggests that the percentage of women age 15-19 ever-married may differ markedly from the reported percentage in Costa Rica, the Dominican Republic, French Guiana, Guyana, Mexico, Nicaragua, Panama, and Paraguay, estimated at 30-49 percent in early unions, and in the British Virgin Islands, El Salvador, Haiti, and Honduras, estimated at 50+ percent in early unions (see Table 10, pp. M-140-141).

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Table 9. Marriage, Fertility, and Socioeconomic Factors, Most Recent Available Data, Africa

Country	Year	% Females Age 15-19 Ever-Married	Rank Order	Source Code[a]	Year	ASFR Age 15-19	Rank Order	TFR	Rank Order	Source code[a]	Year	% Females in School at 1st & 2nd Levels[b]	Rank Order	Year	% Females Age 20-24 Economically Active[c]	Rank Order	% Urban[d]	Rank Order
Burundi	1965	12	1	M132	1970-71	56	1	6.2	11	F272	1975	10	25	1975	72	8	2	21
Botswana	1971	14	2	M131	1971	96	2	6.5	16	F271	1976	67	4	1975	76	6	9	17
Somalia	1963	14[e]	2	M151		NA		NA			1976	20	20	1975	36	21	NA	
Rwanda	1970	18	4	M149	1970	103	3	7.5	26	F293	1976	32	14	1975	89	1	4	20
Lesotho	1966	22	5	M142	1966	NA		5.3	5	F284	1976	92	2	1975	74	7	1	22
Ghana	1970	32	6	M138	1967-69	163	12	7.1	22	F280	1976	38	9	1970	61[f]	12	32	2
Kenya	1969	36	7	M141	1978	177	18	7.9	27	F283	1976	64	5	1975	43	20	10	16
Angola	1960	42	8	M129	1960	NA		6.2	11	F269	1972	33	13	1975	9	27	NA	
Zambia	1969	42	8	M158	1974	137	5	6.7	17	F304	1975	58	7	1977	29[f]	24	30	4
Upper Volta	1968	44	10	M156	1973-74	124	4	7.2	24	F302	1976	7	27	1975	85	4	11	14
Tanzania	1973	45	11	M153	1972-73	137	5	5.6	6	F299	1975	36	12	1975	50	16	6	19
Liberia	1971	46	12	M143	1971	188	20	5.7	8	F285	1975	28	16	1974	22[f]	25	NA	
Zaire	1955-57	46	12	M157	1955-58	175	16	6.3	13	F303	1970	38	9	1975	60	13	24	7
Cameroun	1963-64	48[g]	14	M133	1964	226	24	5.7	8	F273	1976	59	6	1975	62	11	20	9
Uganda	1969	50	15	M155	1969	171	14	6.9	18	F301	1976	27	17	1975	45	19	NA	
Togo	1958-60	53	16	M154	1961	151	10	7.0	20	F300	1976	43	8	1975	53	15	13	11
Central Afr. Rep.	1959-60	58	17	M134	1959-60	142	8	5.0	2	F274	1975	30	15	1975	86	3	NA	
Congo	1960-61	58	17	M136	1960-61	138	7	5.2	4	F276	1975	91	3	1975	34	22	38	1
Gabon	1960-61	63	19	M137	1960-61	171	14	4.1	1	F278	1975	107	1	1975	46	18	32	2
Senegal	1960-61	63	19	M150	1976	165	13	6.4	14	F294	1975	21	19	1970-71	64[f]	10	29	5
Mauritania	1964-65	66[h]	21	M145	1964-65	143	9	5.8	10	F288	1971	5	28	1975	3	28	14	10
Benin	1961	67	22	M130	1961	197	22	6.9	18	F270	1975	20	20	1975	69	9	13	11
Nigeria	1965-66	72[i]	23	M148	1965-66	181[j]	19	5.6[j]	6	F292	1973	25	18	1975	50	16	23	8
Chad	1963-64	73	24	M135	1964	162	11	5.1	3	F275	1976	11	24	1975	30	23	12	13
Ivory Coast	1957-58	74	25	M140	1962-64	192	21	6.4	14	F282	1975	38	9	1975	78	5	28	6
Mali	1960-61	79	26	M144	1960-61	219	23	7.4	25	F287	1975	13	22	1975	89	1	11[k]	14
Niger	1960	81	27	M147	1959-60	175	16	7.1	22	F291	1976	8	26	1975	11	26	8	18
Guinea	1955	82	28	M139	1954-55	240	25	7.0	20	F281	1971	13	22	1975	59	14	NA	
Cape Verde		NA				NA		NA				NA		1975	10		NA	
Ethiopia		NA			1968-70	163		5.8		F277	1973	9		1975	46		9	
Equatorial Guinea		NA				NA		NA			1970	38		1975	4		NA	
The Gambia		NA			1973	199		6.4		F279	1976	13		1975	74		10	
Guinea-Bissau		NA				NA		NA			1976	44		1975	3		NA	
Malawi		NA			1970-71	132		6.7		F286	1976	36		1975	53		6	
Mozambique		NA			1970	110		6.6		F290	1972	21		1970	33		NA	
Sierra Leone		NA			1973	237		6.4		F295	1975	19		1975	44		14	
Swaziland		NA			1966	120		6.9		F298	1976	76		1975	74		15	
Zimbabwe Rhodesia		NA				NA		NA			1976	49			NA		NA	
All countries																		
Unweighted mean		51				161		6.3				36			49		16	
Weighted mean[l]		55				164		6.2				30			46		16	

NA = not available

[a] Codes refer to source information listed in Table A9 of supplement, available on request.

[b] Source: UNESCO (267), Table 1. The gross enrollment ratio at the first and second levels is the total enrollment of pupils of all ages at those two levels divided by the population of official school ages for those two levels. For countries with nearly universal education of the school-age population at the first level, the gross enrollment ratio will exceed 100 if many pupils are older than the official school ages. Second-level schooling includes general education, teacher training, and other secondary-level vocational-technical training. All ratios are expressed as percentages.

[c] Source: International Labour Office (122) Special Table (ILO estimated rate for midyear 1975) unless otherwise noted. Economically active population defined as employers, the self-employed, employees, unpaid family workers, members of producers' cooperatives, members of the armed forces, and unemployed persons with previous job experience.

[d] Source: 1970 data from World Bank (294) p. 510-513. Percentage of the population living in urban areas, generally defined as cities and towns; national definitions vary.

[e] For 10 small towns in the north

[f] Source: International Labour Office (121) Table 1A, or (122) Table 1

[g] Douala only

[h] Based on sample survey of 27 urban centers

[i] From Rural Demographic Sample Survey

[j] Rural population only

[k] As of 1960

[l] Mean weighted by 1975 population as reported in US Bureau of the Census (280)

Data from 27 countries for which estimates from comparable periods are available, however, show no association between the prevalence of early marriage and total fertility rates (see Figure 11). The 12 countries where less than half of the women 15-19 are married have an average total fertility rate of 6.5, a rate slightly higher than the average for the 15 countries where half or more are married at age 15-19. Using age-specific fertility among young women as a check on the validity and consistency of age at marriage data, when countries with both a high rate of early fertility and a high rate of early marriage are contrasted with countries where both rates are low, there is still no meaningful difference in total fertility rates. Countries above the median in percentage married and age-specific fertility for women 15-19 have an average fertility rate of 6.4, while countries low on both measures have an average fertility rate of 6.7.

Infertility, Polygyny, and Marital Instability

Several characteristics of African marriage and fertility patterns may explain why, at the national level, age at marriage appears to be unrelated to total fertility. While some aspects of African life encourage both early marriage and high fertility — for example, high infant mortality — other aspects tend to encourage early marriage but do not necessarily encourage high overall fertility. Chief among these are involuntary infertility and marriage patterns that include high rates of polygyny (the practice of having more than one wife), separation, divorce, and widowhood.

Infertility or subfecundity may be partly responsible for the lack of an association between age at marriage and total fertility. Widespread infertility may increase the pressure to marry near the age at menarche because families are concerned about childlessness and want to maximize the childbearing potential of young women. At the same time, of course, both infertility and subfecundity have lowered the total fertility rate, counteracting any effect of early marriage.

Some impairment of fertility, perhaps due to venereal or other diseases and to unsanitary childbirth practices, has been widespread in tropical Africa, particularly in the central regions (6, 210). Low fertility in Gabon in 1960-1961 — an estimated total fertility rate of about 4 — was probably due to infertility. At the time, from 30 to 35 percent of women over the age of 25 had never borne a live child (318), a rate of childlessness much higher than the 5 percent expected in a noncontracepting population (210). In northern Cameroun in 1960, about 35 percent of women 25-45 were childless. In 1959, some tribes in the Central African Republic had birthrates as low as 20. Variations in birthrates within the Congo in 1955-1957 correlate with rates of infertility (210). Regions of infertility have also been noted in Tanzania, Uganda, and Kenya (97, 210).

Polygyny is made possible by marrying young women to older men. A 5-10 year difference in age between spouses assures a sizable excess of women over men in the marriageable ages of a growing population (285). In addition, men married to women who have failed to bear more than one or two children may take on additional wives. Older women are more likely to be in polygynous unions than young women (185, 285), but many of these polygynously married older women are not in their first marriages. They may have had no children in their first marriages and remarried as additional wives. Others are "inherited widows," the wives of male relatives who have died.

Intuitively, one would expect polygyny to increase birthrates because it facilitates the remarriage of widows and permits men to divorce sterile wives or take on additional, more fertile wives. But in African women polygyny does not appear to be associated with higher birthrates, provided childless (and thus possibly sterile) women are excluded from the analysis (97, 190). In Tanzania in 1973, polygynously married women age 20-29 had as many live births as monogamously married women, but women over age 30 in polygynous marriages had slightly fewer births (97). Furthermore, polygyny seems to be more common where infertility is a problem. Perhaps this is because polygyny facilitates divorce and remarriage, making it easier for fertile partners to find each other. On the other hand, divorce removes women from exposure to the risk of pregnancy, reducing their completed fertility. Also, the age difference between spouses means many women are widowed, again reducing their exposure to intercourse. For these reasons a polygynous society may be characterized by early marriage for women that is not necessarily reflected in the fertility rate.

Polygyny has been fairly common in many regions of sub-Saharan Africa. Surveys in the 1950s found that the proportion of men in polygynous marriages ranged from 12 percent in the Mbalmayo region of Cameroun to about 40 percent in Guinea (285). In the mid-1960s, about 33 percent of women in two major towns and five rural communities in western Nigeria (190) and 31 percent of women in Lagos were in polygynous marriages (185). In Ghana in 1960, 26 percent of married men had more than one wife (191), and in Tanzania in 1973, 30 percent of married women over age 30 were married to polygynous husbands (97).

High rates of separation and divorce, which may be related to infertility and facilitated by polygyny, also help to obscure any relationship between age at marriage and total fertility among African countries. Divorce, separation, and remarriage are associated with lower fertility for individual women. For instance, in all areas of mainland Tanzania outside Dar es Salaam, women age 40-49 who had been married more than once averaged two fewer live births than women of similar age who had married only once and were in monogamous marriages (97).

Separation and divorce are common in Africa. In Tanzania in 1973, 5 percent of women age 25-29 were separated or divorced and another 16 percent were currently married but not for the first time (97). Among women age 40-44, only 38 percent were in their first marriages and married monogamously; 25 percent had married more than once, 8 percent were separated or divorced, 18 percent were in polygynous marriages, 7 percent were widowed, and 2 percent had never married (97). In Ghana in the mid-1960s, 19 percent of rural women and 37 percent of urban women had been in two or more unions (200). In Chad in 1964, about one-quarter of married women had been married more than once (204). In Ibadan, Nigeria, in 1973, the figure was 15 percent of married women age 25-34 and 25 percent of those over 35 (94). These rates suggest that a substantial amount of time after first marriage may be spent outside of marriage, with a corresponding effect on completed fertility.

The combined effects of infertility, subfecundity, polygyny, separation, and divorce help to explain why an early age at marriage and very high fertility between age 15-19 does not lead to as high a total fertility rate as might be expected. The lack of extensive family planning services in Africa means that modern methods of contraception are not available outside of a few cities. Thus, as might be expected for an area that is just beginning its demographic transition, what controls there are on population growth tend to be almost entirely the traditional ones — poor health, high mortality, breast-feeding, and abstinence.

Education

Socioeconomic factors are probably beginning to have a greater influence on African fertility but the impact of education, employment, and urbanization is not as clear-cut as in other parts of the world. For example, African women who have attended school tend to marry later than women who have never been to school, but fertility levels are not always related to school attendance. In many places, women with primary-level schooling have more children than either those with no education or those who have gone to secondary schools or universities. This may be because primary school attendance is often associated with better living conditions and less adherence to the traditional practice of abstinence for several years after childbearing. There may also be a methodological bias in that women who have attended school also are less likely to underreport births of children who died in infancy. As a consequence, although more education is linked to later marriage, neither later marriage nor more schooling substantially affects fertility levels.

Many surveys in Africa document the association between age at marriage and education. According to the 1973 Nigerian Migration Project surveys in Benin City, Kano, and Ibadan, women age 15-24 who had attended either Koranic school or primary school were less likely to have married than those who had no education. Those who had attended secondary school were even less likely to have married (94). Among Tanzanian women age 20-24, the proportion single rises from 2 percent for women with no education to 9 percent for those with five to eight years of school and reaches 17 percent for women with nine or more years of education. For those married, median age at first marriage among women with no education was 16.9 and among those with 9 to 13 years of education, 20.9 (97). Even in places where it is very common for women to marry and have children before age 20, longer schooling, especially "western-style," non-Islamic schooling, is associated with later marriage and childbearing. In Sokoto, Nigeria, women who had attended a girls' "western-style" boarding school were compared with women of the same age and social status who had not attended the boarding school but many of whom had received many years of Koranic education. Of the women with "western-style" education, 49 percent were married and 14 percent had been pregnant before age 16, while 94 percent of the women who had not attended the boarding school were married before 16 and 45 percent had become pregnant by that age (250).

Why women who have attended secondary school marry later and have their first children later is easily understood. School attendance is more difficult for young mothers and married women because of their household responsibilities. More importantly, many schools refuse to admit married women, even if childless, and most schools discourage their attendance. Studying may be less compatible with infant care than is the farm and market work usually performed by African women (175).

Later marriage and postponement of first birth associated with more education do not necessarily result in lower completed family size. The differences in fertility are usually largest in the early adult years and then diminish considerably or entirely by the time childbearing is completed (57, 184, 185, 186, 187). Data from the Nigerian Migration Project surveys illustrate the disappearance of the difference in fertility among older women. Among women age 15-24 in Ibadan, 77 percent of those who had attended secondary school had no children compared with 50 percent of those with Koranic or primary education and 38 percent of those with no schooling. Clearly, at those ages education was connected with delayed childbearing. Among women over age 35, however, 45 percent of those who had attended secondary school had five or more children compared with 63 percent of those with Koranic or primary school education and only 29 percent of women with no education.

Data from the Nigerian Migration Project illustrate a phenomenon common in Africa: completed family size is greater among those who have attended school than among those who have not, but among those who have attended school, longer school attendance is associated with lower completed family size. These relationships have been found in Tanzania (97) and Ghana (321) as well as Nigeria (94, 188). Since effective contraception was largely unavailable at the time of these studies in the 1960s and early 1970s, the relatively low fertility of uneducated women, contrary to the pattern seen in developed countries, may be due more to abstinence and to poor health that impairs fertility than to use of any intentional birth control techniques.

Occupations of Women

When young, unmarried women hold paying jobs outside the household, they often marry at an older age (50, 67, 68, 81, 135). Whether women who work for pay outside the household also bear fewer children has been studied extensively, but

In Cameroun, a wedding party dances on the highway. Travelers must present the bride with gifts before they are allowed to pass. (United Nations)

Sudanese Woman Trains as Midwife

A 26-year-old member of the Zande tribe, Catholic, married at 18, and now divorced, told Perdita Huston what sort of a husband she hopes for now and why she wants to be a midwife.

Do you have any children?

No.

Did you want to get divorced?

Yes, my husband was beating me, mistreating me. You know, sometimes if the husband has another wife he will mistreat you.

Did your husband have other wives?

Yes, there were two, but that was not so bad. It was just the husband who was not a good man.

Does your father have more than one wife?

No, only one.

How many brothers and sisters do you have?

Four brothers and two sisters. The eldest brother went to school until he finished technical school. The other brothers and sisters did not go to school at all.

If you married again someday, what qualities do you want to find in a husband?

I want my husband to be kind and a hard worker. I want him to look after the family at home.

And how many children would you like to have?

Four.

How are you going to keep from having more?

I will become too old.

Would you educate your daughters as much as your sons?

I would help the girls more because when they grow up the girls will be the only ones looking after me. My brother did not care for my mother, that's why I want girls. At least they will look after me just as I do for my mother. I wanted to become a midwife because my father and mother are old. My brothers and sisters had not been to school. They are only digging in the gardens. I thought it would be good to become a midwife so I could help my parents. I met some girls who had taken this course. I saw that they learned good things, that if someone becomes a midwife, it will help the country. That's why I have chosen it. Now I can help my country. (105)

there is little empirical evidence that women who are economically active delay or forego childbearing for that reason (218). Furthermore, while in many developing countries responsibility for child care sometimes constrains women's economic activity (230, 291), recent studies in Ghana, Kenya, and Nigeria have found no evidence that African women with more children were less likely to be working (218, 230). Although single women in urban areas are more likely to work outside the household and this may facilitate later marriage, the effect of this phenomenon on the number of children they bear has been negligible.

In sub-Saharan Africa, women perform most of the work required for food production (20). This is especially true where the agricultural system involves shifting "slash and burn" cultivation. Where the plow or other more modern or more intensive methods of working the land are used, or where the land produces a cash crop, the participation of women in agriculture varies more and generally is less. Nonetheless, women may still perform more than half the farm work in several regions of Africa (20).

Women also account for a large proportion of the labor force involved in trade in many parts of Africa, including Ghana, the Yoruba sections of Nigeria, and eastern Nigeria, where the Ibo predominate. Mostly women sell agricultural products, including vegetables, milk, eggs, and poultry (20, 153, 290). Trading is closely linked to women's role in agriculture and does not seem to provide an entrée to roles in modern commerce: "Given the high rate of illiteracy and the high average age of the market women, it was not to be expected that they would be recruited as shop assistants in the modern trade sector" (20). In the traditional division of women's labor by age, girls take care of younger children and do lighter work around the household; young women cook, prepare food, and take care of the crops; and older women take the extra produce to market (20). Although women who have migrated to the city, as well as long-time urban residents, continue to engage in petty trading, and some operate small shops, they do not predominate in either paid sales or large-scale trade positions. Younger women with more education tend to look down on farming and petty trading as an occupation and prefer office work, teaching, and nursing (20, 225, 290).

Nevertheless, labor force participation by African women has remained at high levels. Working for pay outside the household is common, particularly among young unmarried women in cities. For instance, according to a 1973-1974 survey conducted in Nigeria, approximately one-third of urban women age 20-24 and 12 percent of rural women that age worked for pay outside the household. More than half of single women age 20-24 — both urban and rural — worked outside the home for pay, but fewer than 20 percent of married women that age did so (218).

Although there are more opportunities to work for money outside the household in cities than in rural areas, in only a few countries is age at marriage clearly later in urban than in rural areas. Rural-urban differences in percentage ever-married at 15-19 or in mean age at marriage were negligible — less than 10 percentage points or less than a half year, respectively — in Ghana in the mid-1960s (200, 321, 328), in Liberia in 1971 (162), and in Tanzania in 1973 (97). Moreover, urban-rural differences are not consistent from country to country. For instance, in Zaire (1955-1957), more urban than rural women age 15-19 were married, and their higher fertility rate accounted for 40 percent of the total difference in urban over rural fertility. In Ghana (1960), marriage and fertility rates among 15-19 year old women were slightly lower in cities than in rural areas (192). One reason for these inconsistencies may be heavy rural-to-urban migration by African males, which would make it easier for urban women and harder for rural women to find husbands.

To conclude, although economic activity rates of women in Africa are high and young unmarried women in cities are particularly likely to be working outside of their households for money, there is little evidence that significant delays in marriage or lower fertility result in most African countries. In fact, women are expected to make substantial contributions to their own and their children's economic support; working for pay is part and parcel of child rearing rather than a competitive or conflicting activity. In the future, the importance of the kinship support system among women of all ages may decline. As older daughters increasingly seek education, they will not be available to take care of the younger children, as they often do now. As a result, having young children may become more of a constraint on economic activity, and women may increasingly choose to delay first births for this reason.

LATIN AMERICA

Investigating age at marriage in Latin America is particularly difficult because many families are established by consensual union, without legal or religious sanction. Other unions are sanctioned religiously or legally or both. Early censuses often counted only legal marriages. Recently some countries, for example Brazil and Mexico, have counted people in religiously sanctioned marriages as "married" even if the unions were not legalized. Many countries have added a category to their census reports for "consensual unions," "de facto unions," or "free unions," in addition to the usual categories of marital status: single, married, separated, divorced, and widowed. Changes in reporting from one census to the next make data on trends in age at marriage unreliable.

Even where consensual unions are now officially counted, people fail to report them to census takers. Many people, especially men, prefer to state their legal status rather than their de facto status (174). Men's responses to census and survey questions about marital status generally reflect their attitudes concerning their responsibility for the support of a woman and her children. Unions in younger age groups are particularly underreported since relatively long-lasting consensual unions are more likely to be reported than are visiting relationships and ones recently begun. Consensual unions are sometimes legalized, but often only after years of cohabitation, sometimes interspersed with periods of maintaining separate residences. Concomitantly, many households are headed by women.

An example of the problem of underreporting comes from Colombia, where 1973 census data indicate 15 percent of women age 15-19 have been or are married, but the World Fertility Survey, which questioned individuals more closely, found 25 percent of this age group in unions in 1974 (52, 256). The failure to report consensual unions, along with variations in official reporting, make age at marriage data especially unreliable in Latin America. Using the data available, however, yields estimates that half of women marry by the time they are in their early 20s (273, 274, 275, 335, 336, 337).

The birth of a child may be a better indicator of a union than marriage as officially reported. In the six Latin American countries for which World Fertility Survey data are available, on average about 45 percent of women had their first children before or within 11 months after marriage (52, 70, 169, 195, 207, 313). All types of unions were counted as marriages in the surveys. In this section of this report, the age-specific fertility rate of women age 15-19 will be used to substitute for the percentage married at those ages since the former appears to reflect more accurately the prevalence of early unions.

Prevalence of Early Unions

The average proportion of women 15-19 reported as married in 30 Latin American countries where data have been collected since 1960 is only 17 percent (see Table 10) compared with over 50 percent in the Indian subcontinent and Africa. Although fewer women in this age group are reported married than in any other region except East Asia, early childbearing is not uncommon. The age-specific fertility rate for women 15-19 was 89, a rate substantially higher than the average in East Asia, almost as high as that in the Middle East, Southeast Asia, and the Indian subcontinent, but far below that in Africa. Age-specific fertility rates of women 15-19 are as high as 140 or more births per 1,000 women in Belize, El Salvador, Honduras, and St. Kitts-Nevis. Low rates — about 50 or less — are found only in Haiti, Martinique, and the Panama Canal Zone (see Table 10).

Low total fertility rates have been reached in a number of Latin American countries without the very low rates of early childbearing that have contributed so substantially to low total fertility rates in some Asian countries. Of the 13 Latin American countries or areas with total fertility rates of less than four, 10 have age-specific fertility rates for women 15-19 of more than 70, and two — Costa Rica and the US Virgin Islands — have rates of more than 100. Less surprising are the high early fertility rates in countries with high total fertility. Total fertility rates between 1970 and 1975 were above or near six in five Central American and two South American countries. Of these, only Bolivia had an age-specific fertility rate for women 15-19 of less than 100. (See Table 10* and Figure 12.)

Trends in Age at Marriage and Fertility

Two-fifths of all of the countries in this region for which data are available show declines in fertility among women age 15-19, while the remainder show little change (see Figures 13-15). Where fertility is falling among young women, total fertility rates also are falling. In several countries, however, as the analysis of prevalence suggests, total fertility is declining without any noticeable drop in the fertility of young women.

In Central America and the Caribbean, the fertility of women 15-19 has declined since about 1960 in nine of the 16 countries and areas for which data are available. In these nine areas — Barbados, the Dominican Republic, Guatemala, Haiti, Nicaragua, Panama, Puerto Rico, Trinidad and Tobago, and the US Virgin Islands — the total fertility rate is declining as well. In the remaining seven countries — the Bahamas, Costa Rica, El Salvador, Honduras, Jamaica, Martinique, and Mexico — the fertility rates of 15-19 year olds have not changed markedly. The Bahamas, Honduras, and Mexico also show little change in total fertility, but in Jamaica, Martinique, and El Salvador, some drop in total fertility occurred. In Costa Rica, the total fertility rate has dropped precipitously despite a virtually unchanging age-specific fertility rate among women 15-19 (see Figures 13 and 14).

In South America, fertility rates of women 15-19 have not changed markedly in most countries. Data are available for 11 of 13 nations. Six — Argentina, Bolivia, Chile, Ecuador, Paraguay, and Uruguay — show little or no recent downward trend in early fertility. Total fertility also has not changed in these countries, with the exception of Chile and Paraguay. Chile presents a dramatic contrast: total fertility has dropped

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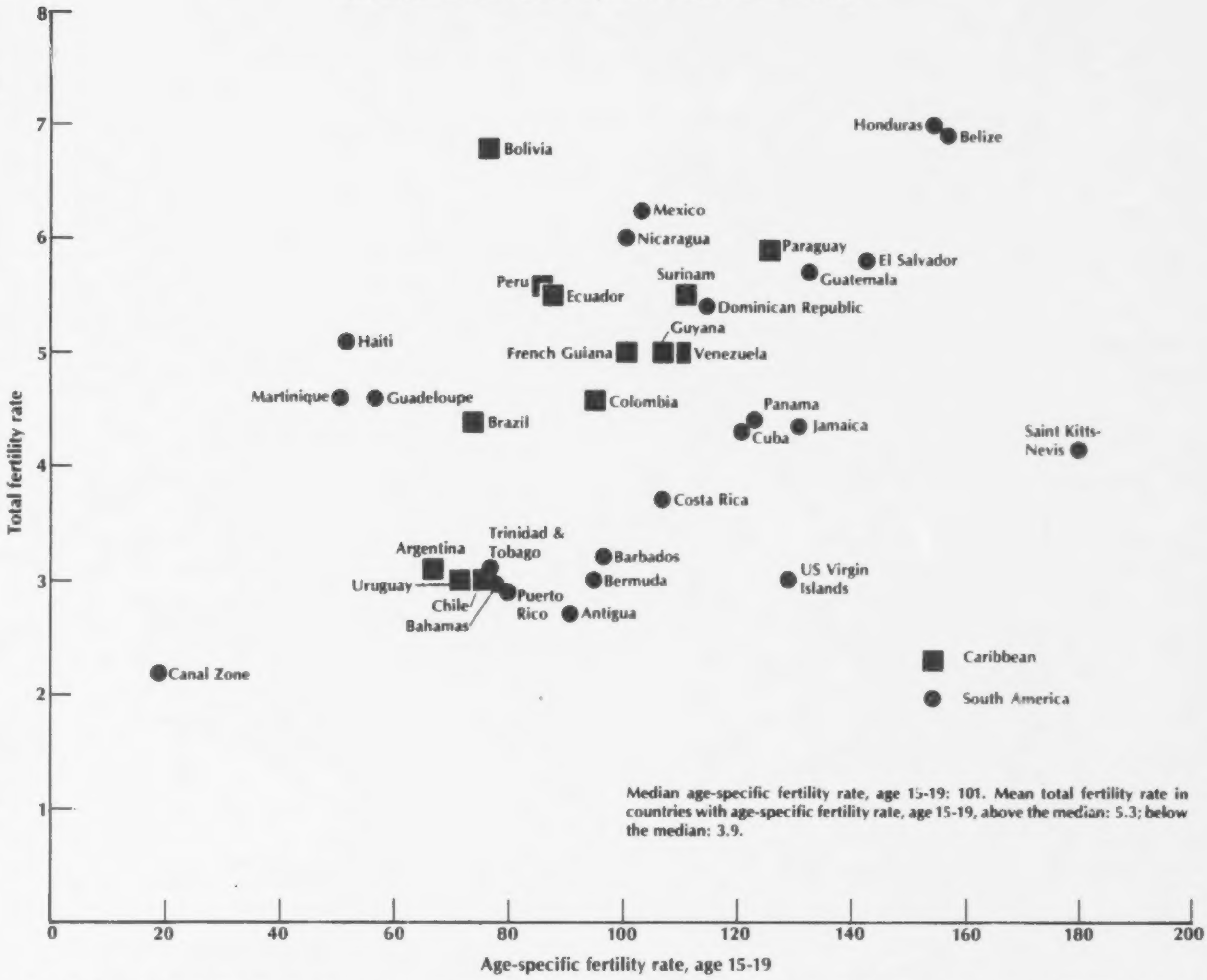
*Colombia, as shown in Table 10, appears to have the highest proportion married at age 15-19 in Latin America but low early and total fertility. The reported proportion married, drawn from the World Fertility Survey (52), may be higher than other national figures because unions of all types were carefully counted. The age-specific fertility rate for women 15-19 of 54 may be low because it was calculated by a method unlike that used for rates for other countries or in Colombia previously. The 1975-76 estimated fertility rate for women 15-19 was 94 (see Table A10, source code F129, in supplement listing data sources, available on request).

**Figure 12. Fertility Rate by Percentage of Women Age 15-19 Ever-Married
Most Recent Available Comparable Data, Latin America**



Median age-specific fertility rate, age 15-19: 101. Mean total fertility rate in countries with age-specific fertility rate, age 15-19, above the median: 5.3; below the median: 3.9.

In Latin America, including the Caribbean, since age at marriage data are not reliable, the age-specific fertility rate for women 15-19 is used as an indicator of early unions. The relationship between early fertility and total fertility for South American countries (represented by squares) and Central American and Caribbean countries (represented by circles) show many variations and no obvious pattern.

40 percent in 15 years — from 5.1 in 1960 to 3.0 in 1975, while the age-specific fertility rate of women 15-19 remained virtually unchanged between 70 and 80 — a moderately high rate. The reason, of course, is substantial drops in the fertility of older women. In every age group of Chilean women over 30, fertility fell by more than 50 percent (see Table A11, p. M-154). In five South American countries — Brazil, Colombia, Guyana, Venezuela, and Peru — declines in both early fertility and total fertility have occurred (see Figure 15).

With a few exceptions, fertility declines among very young women have not contributed substantially to the total fertility declines of Latin American countries. In most countries 10 percent or less of the declines are attributable to women 15-19. Exceptions are Guyana, at 20 percent; Nicaragua, at 23 percent; Peru, at 22 percent; and the Dominican Republic, at 16 percent. When women 20-24 are considered as well, however, young women have made substantial contributions to fertility declines. Some 64 percent of the total fertility decline in Nicaragua is attributable to women under age 25; 63 percent in Peru; 50 percent in the US Virgin Islands; 44 percent in Guyana; and between 30 and 40 percent in Brazil, the Dominican Republic, Guatemala, Panama, Paraguay, Puerto Rico, Trinidad and Tobago, and Venezuela. (See Table 11.) Since the continuing high fertility rates of women age 15-19 suggest little trend toward later unions or later first births, these declines may be largely the result of increased use of birth control by women age 20-24 who have already had their first child.

Costa Rica

In Costa Rica since the early 1960s, the fertility of women 15-19 has declined only slightly. The insignificant change is like those for young women in many other Latin American countries. The total fertility rate, by contrast, has dropped dramatically — faster and farther than in any other country in the region. (Colombia is close behind.) (See Figures 13-15.) A look at Costa Rica's development, culture, and contraceptive usage suggests why the substantial fertility declines seen in older age groups have yet to appear among women under age 20.

Between 1963 and 1975, the age-specific fertility rate of women 15-19 fell by 10, from 117 births per 1,000 women to 107 — a decline of only 9 percent. During the same period, the fertility rates for women 20-24 declined by 119 births, or 36 percent, and, in age groups 25 to 39, by at least 130 births, or at

Table 10. Marriage, Fertility, and Socioeconomic Factors, Most Recent Available Data, Latin America

Region and Country	Year	% Females Age 15-19 Ever-Married	Rank Order	Source Code[a]	Year	ASFR Age 15-19	Rank Order	TFR	Rank Order	Source Code[a]	Year	% Females in School at 1st & 2nd Levels[b]	Rank Order	Year	% Females Age 20-24 Economically Active[c]	Rank Order	% Urban[d]	Rank Order
CENTRAL AMERICA & CARIBBEAN																		
Martinique	1967	2	1	M118	1970	51	1	4.6	9	F212	1975	101	2	1967	49	5	NA	
Guadeloupe	1967	5	2	M112	1970	57	3	4.6	9	F178	1975	102	1	1974	40	7	NA	
British Virgin Islands	1970	6	3	M103	1960	147	17	7.4	18	F118		NA			NA		NA	
Haiti	1971	6	3	M115	1973	52	2	5.1	11	F194	1971	24	14	1971	75	3	20	11
Bahamas	1970	10	5	M100	1974	78	4	3.0	2	F100		NA		1970	72	4	58	2
St. Pierre	1974	11	6	M125		NA		NA				NA		1974	43[e]	6	NA	
Bermuda	1960	12	7	M101	1965	95	6	3.0	2	F113		NA		1976	79	2	NA	
Costa Rica	1973	15	8	M106	1975	107	9	3.7	5	F143	1976	81	6	1973	30	12	46	4
Dominican Rep.	1974	16	9	M108	1973-74	113	10	5.4	12	F166	1974	72	9	1970	29	13	40	6
Puerto Rico	1970	16	9	M124	1974	80	5	2.9	1	F245	1975	82	5	1978	34	11	NA	
US Virgin Islands	1960	16	9	M127	1974	129	13	3.0	2	F255		NA			NA		NA	
El Salvador	1971	21	12	M110	1973	143	16	5.8	14	F173	1976	63	10	1971	36	10	39	7
Mexico	1975	21	12	M119	1973-75	105	8	6.2	16	F218A	1976	78	8	1978	37	9	59	1
Nicaragua	1971	23	14	M120	1970-71	101	7	6.0	15	F220	1973	56	11	1971	26	14	46	4
Jamaica	1970	25	15	M117	1976	130	14	4.3	6	F209	1975	81	6	1977	81	1	37	8
Panama	1970	27	16	M121	1975	123	12	4.4	8	F224	1976	92	3	1970	40	7	48	3
Guatemala	1973	29	17	M113	1973	133	15	5.7	13	F189A	1970	33	13	1973	17	15	34	9
Cuba	1970	30	18	M107	1965-70	121	11	4.3	6	F146	1975	83	4	1970	25	16	NA	
Honduras	1971-72	31	19	M116	1975	154	18	7.0	17	F201	1975	55	12	1974	20	17	26	10
Antigua		NA			1974	91		2.7		F93		NA		1970	68		NA	
Barbados		NA			1973	97		3.2		F111	1976	94		1970	68		4	
Belize		NA			1971	157		6.9		F112		NA		1970	31		NA	
Panama Canal Zone		NA			1970	19		2.2		F225		NA		1970	43[f]		NA	
St. Kitts-Nevis		NA			1974	180		4.3		F246		NA			NA		NA	
Trinidad & Tobago		NA			1975	77		3.1		F251	1973	62		1970	38		12	
Unweighted mean		17				106		4.7				72			45		36	
Weighted mean[g]		21				107		5.9				72			36		51	

SOUTH AMERICA																		
French Guiana	1967	3	1	M111	1967	101	8	5.0	6	F174		NA		1974	64	1	NA	
Uruguay	1963	10	2	M126	1975	72	3	3.0	1	F253	1974	81	3	1975	43	4	78	2
Chile	1971	12	3	M104	1975	74	4	3.0	1	F122	1975	96	1	1970	32	6	76	3
Paraguay	1972	12	3	M122	1972	126	11	5.9	11	F227	1974	64	10	1972	31	8	37	9
Argentina	1970	13	5	M99	1970	67	2	3.1	3	F97	1976	89	2	1977	47	2	80	1
Brazil	1970	13	5	M102	1976	74	4	4.4	5	F117B	1974	69	9	1973	46	3	56	6
Venezuela	1971	17	7	M128	1974	109	10	5.0	6	F268	1976	74	5	1977	35	5	76	3
Peru	1972	19	8	M123	1976	87	6	5.6	10	F230A	1976	81	3	1972	26	9	52	7
Ecuador	1974	21	9	M109	1974	88	7	5.5	9	F168	1976	73	6	1974	22	11	38	8
Guyana	1960	23	10	M114	1970	108	9	5.0	6	F192	1973	70	8	1970	26	9	30	10
Colombia	1974	25	11	M105	1978	54	1	3.9	4	F130	1975	72	7	1973	32	6	62	5
Bolivia		NA			1975	77		6.8		F115	1976	59		1976	25[e]		29	
Surinam		NA			1970	111		5.5		F248	1975	71		1975	34[h]		NA	
Unweighted mean		15				91		4.8				75			36		56	
Weighted mean[g]		15				80		4.4				75			40		60	
ALL COUNTRIES																		
Unweighted mean		15				101		4.7				74			40		45	
Weighted mean[g]		17				89		4.9				73			39		57	

NA = not available

[a] Codes refer to source information listed in Table A10 of supplement, available on request.

[b] Source: UNESCO (267) Table 1. The gross school enrollment ratio at the first and second levels is the total enrollment of pupils of all ages at those two levels divided by the population of official school ages for those two levels. For countries with nearly universal education of the school-age population at the first level, the gross enrollment ratio will exceed 100 if many pupils are older than the official school ages. Second-level schooling includes general education, teacher training, and other secondary-level vocational-technical training. All ratios are expressed as percentages.

[c] Source: International Labour Office (120) Table 1 or (122) Table 1 unless otherwise noted. Economically active population defined as employers, the self-employed, employees, unpaid family workers, members of producers' cooperatives, members of the armed forces, and unemployed persons with previous job experience.

[d] Source: 1970 data from World Bank (294) p. 510-513. Percentage of the population living in urban areas, generally defined as cities and towns; national definitions vary.

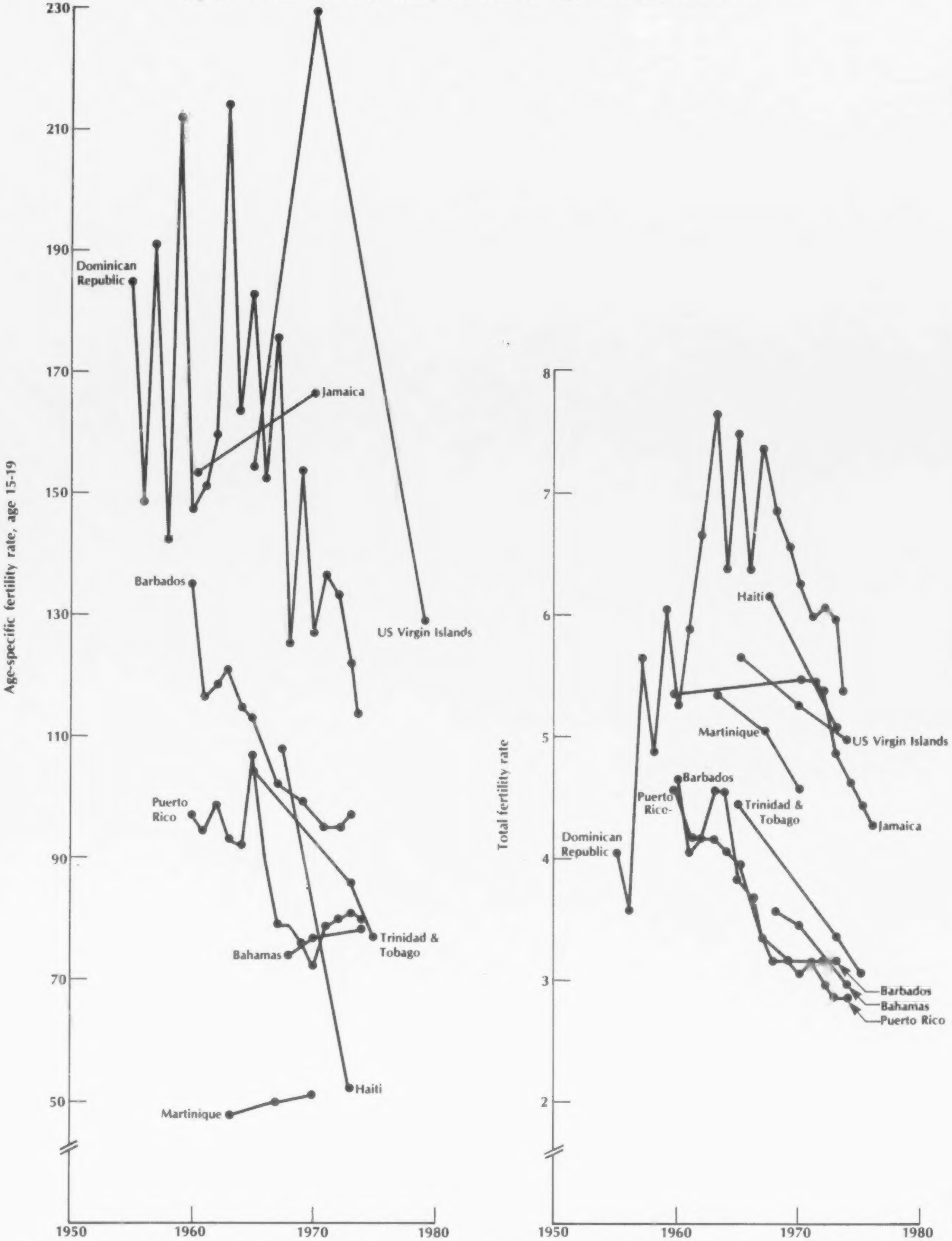
[e] Age 20-29

[f] Age 18-24

[g] Mean weighted by 1975 population as reported in US Bureau of the Census (280).

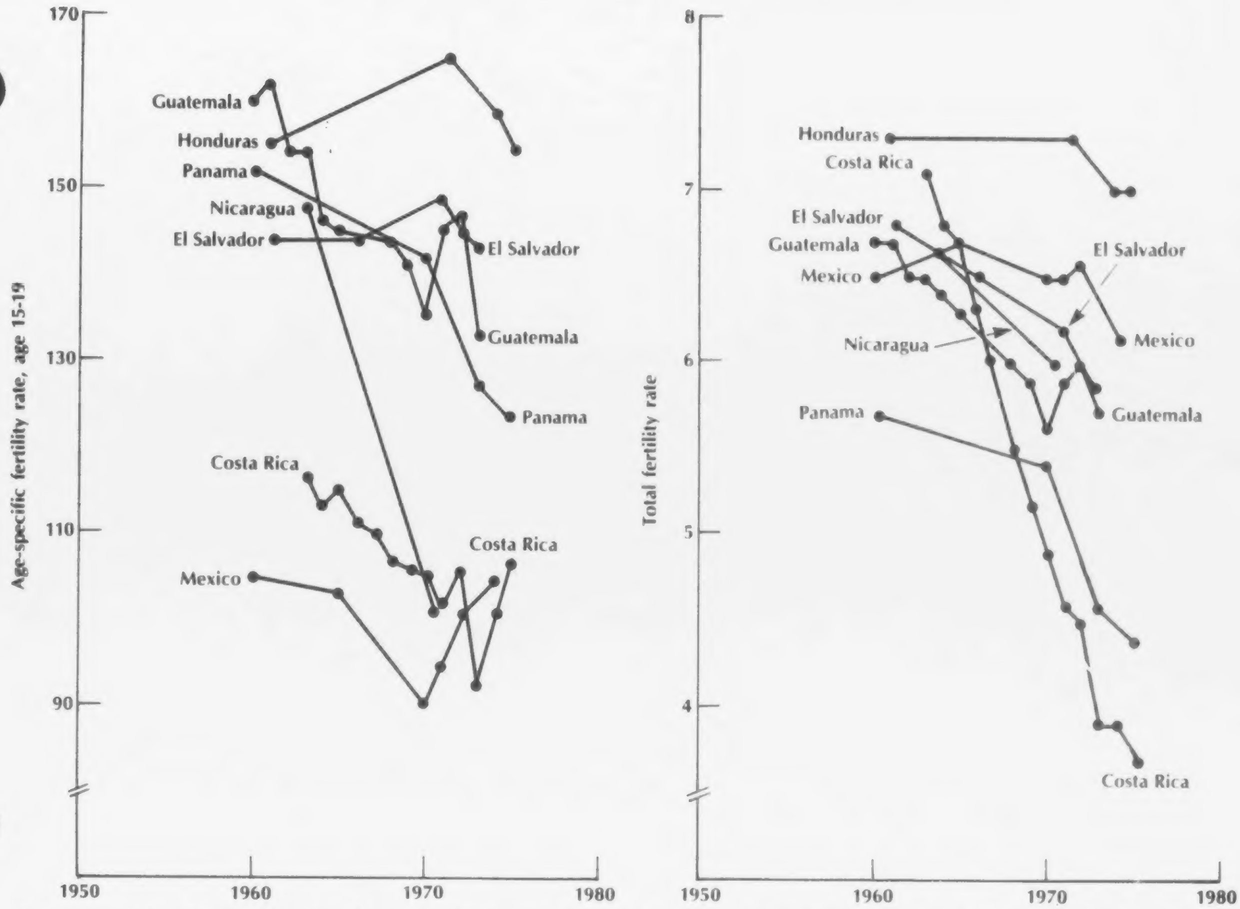
[h] Source: International Labour Office (122) Special Table. ILO projection for midyear 1975.

Figure 13. Trends in Early Fertility and Total Fertility, Caribbean, 1955-1975



In the Caribbean, as elsewhere in Latin America, the age-specific fertility rate for women 15-19 is used as an indicator of age at marriage rather than unreliable data on the proportion of women 15-19 ever-married. Where the age-specific fertility rate of women 15-19 has dropped — Barbados, the Dominican Republic, Haiti, Puerto Rico, Trinidad and Tobago, and the US Virgin Islands — the total fertility rate has also dropped. Among countries where early fertility has not changed — the Bahamas and Martinique — total fertility has declined.

Figure 14. Trends in Early Fertility and Total Fertility, Central America, 1960-1975



In most countries of Central America, the age-specific fertility of women 15-19 and the total fertility rate have changed little. In Panama and Guatemala, early fertility is declining and so is total fertility. In Costa Rica, total fertility has fallen sharply despite a virtually unchanging fertility rate among 15-19 year olds. Since the early 1970s total fertility in Mexico has declined sharply.

least 50 percent. As a result, the total fertility rate plummeted from 7.1 in 1963 to 3.7 in 1975 (see Table A11, p. M-154).

The drop in total fertility in Costa Rica is comparable to the rapid drops which have taken place in South Korea, Taiwan, and Singapore (see Figure 5). Total fertility rates of these countries in 1975 were 3.7 in Korea — the same as in Costa Rica — 2.8 in Taiwan and 2.1 in Singapore in 1977 (see Tables 3 and A3, in supplement). Costa Rica, however, reported 15 percent of 15-19 year olds married in 1973 (see Table 10), while Korea reported only 3 percent in 1974; Taiwan, 6 percent in 1975; and Singapore, 5 percent in 1970 (see Table 3). The 1975 age-specific fertility rate of 15-19 year olds in Costa Rica was considerably higher than in these Asian countries — 107 compared with 8 in Korea, 37 in Taiwan, and 17 in Singapore. (In fact, the age-specific fertility rate of 15-19 year olds is so high that it suggests that the percentage married figure is an underestimate of early unions.)

Why is early fertility still so much higher in Costa Rica than in these Asian countries? It is not easy to answer this question. Many of the factors that appear to encourage both later marriage and lower total fertility are present to some extent in Costa Rica — opportunities for women to attend school, jobs for young women that are incompatible with marriage, and uneven sex ratios in urban and rural areas. Measures of female school enrollment and economic activity in Costa Rica are not exceptional for the region, however, and stand near the medians (see Table 10). The female school enrollment rate in Costa Rica, at 81 percent, is similar to rates found in Asian countries where early fertility has declined substantially and women marry late.

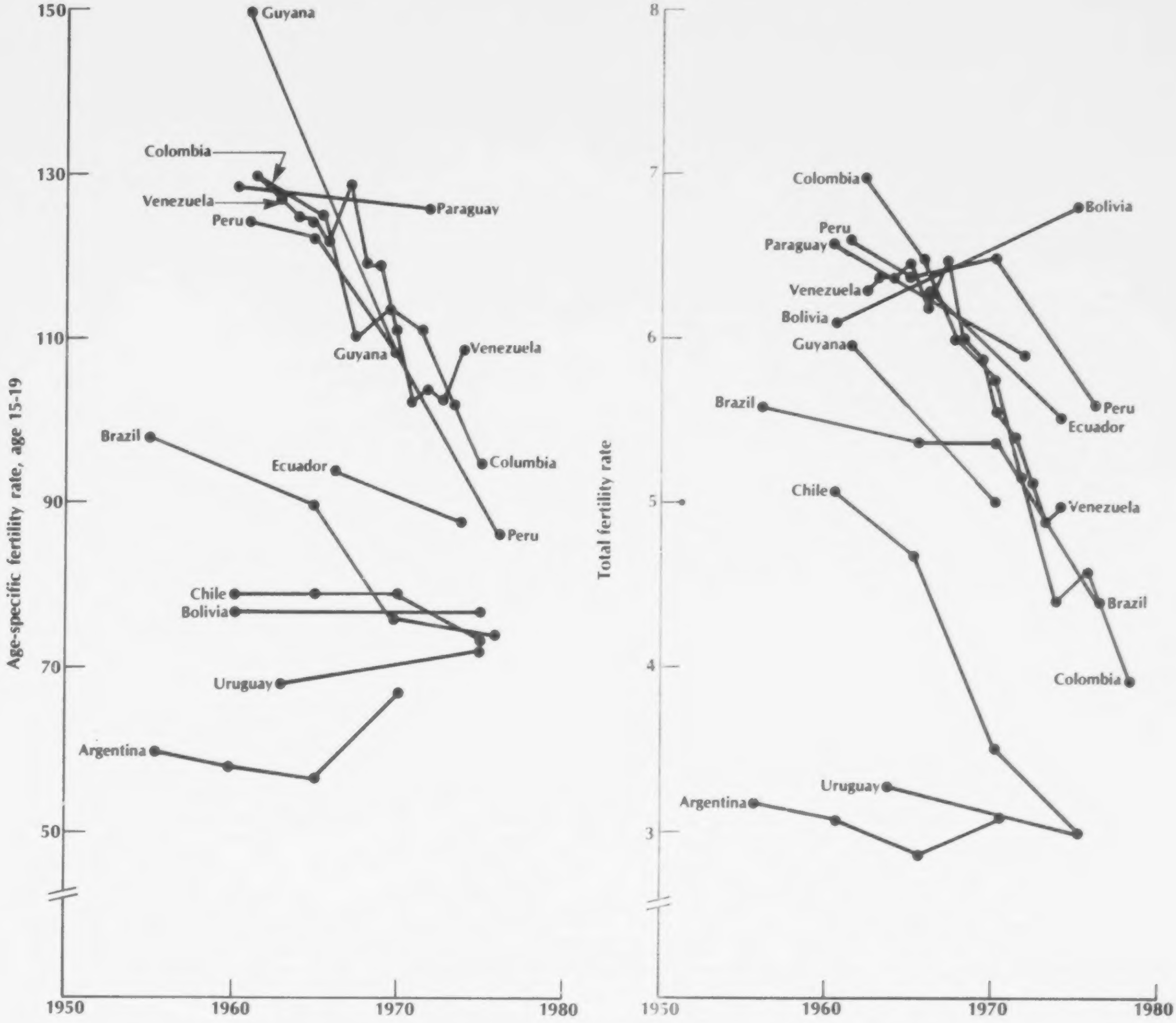
With 46 percent of the population living in urban areas, Costa Rica is slightly more urbanized than most countries and areas of Central America and the Caribbean. It ranks fourth among 10 countries and areas for which urbanization and age at marriage data are available (see Table 10). The pattern of residence and work in Costa Rica make it more urban in character than this figure suggests. Some villages function in effect as suburbs; many of their residents work in cities or in nonagricultural jobs (82, 86). In substantial numbers young women, especially those age 15-25, migrate from rural to urban areas seeking work. The result is skewed sex ratios: more men than women of marriage age in rural areas, and the reverse in the cities.

The young women who move to towns and cities often seek work as domestic servants. In 1973, over half of all economically active women were service workers (120). This pattern, common in Latin America, seems advantageous both to young women and to their rural families. Domestic service offers a young woman the opportunity to move to the city and gain some independence from her family. For their part, her parents know that their daughter's basic needs will be met by the people she works for and that she will be more secure than she would be living alone. Domestic service is not a life-long employment, however. It offers little opportunity for upward mobility and it pays poorly. Most women work as servants for less than 10 years, then marry (61, 127, 339). Further, domestic service is incompatible with marriage and child raising, and, when they become pregnant, women working as servants frequently obtain abortions (288).

Data from the Costa Rica World Fertility Survey explain better than these socioeconomic variables why early fertility remains relatively high while later fertility has dropped markedly (313). In Costa Rica the overall rate of premarital conceptions is over 26 percent — more than double the rate of any Asian country and the second highest of any Latin American country with published World Fertility Survey data (134) (see Table 2). While the proportion of women reporting premarital conceptions rises with age at marriage, a substantial portion of women who married young conceived their first child before marriage — almost 20 percent of those who married at age 18-19. In other words, many Costa Rican women begin sexual activity at an early age and marry (or report themselves to be living in unions) only after they become pregnant or have a child. Thus, almost half of all ever-married women age 20-24 report at least two live births (313).

Women in Costa Rica are quick to adopt contraception after one or two pregnancies, however. Among 20-24 year old women currently living in unions who had two living children, only 6 percent were pregnant when interviewed for the World Fertility Survey and 75 percent were using contraception. Of those with one child, 14 percent were pregnant and 68 percent were using contraception (313). By contrast, among married Korean women of comparable age and number of living

Figure 15. Trends in Early Fertility and Total Fertility, South America, 1960-1974



Most countries of South America fall into one of two groups: those with initially high but rapidly declining early fertility rates or those with lower but little changed early fertility rates. Total fertility rates are declining in the former group, while in the latter, they are not. The exceptions in the latter group are Chile and Paraguay, with little change in early fertility but drops in total fertility.

Table 11. Contributions to Declines in Fertility by Women of Various Age Groups in Selected Countries of Latin America, 1960s and 1970s

Country or Area	Source Code	Years	Total Fertility Rates (TFRs)	Decline in TFR	% of Decline Attributable to Women Aged				
					15-19	20-24	25-34	35-49	All ages
CENTRAL AMERICA & CARIBBEAN									
Bahamas	F98, F100	1968-1974	3.6 - 3.0	0.6	*	25	43	36	100
Barbados	F106, F111	1965-1973	4.0 - 3.2	0.8	10	9	36	46	100
Costa Rica	F131, F143	1963-1975	7.1 - 3.7	3.4	1	18	52	29	100
Dominican Republic	F159, F166	1967-1974	7.4 - 4.8	2.0	16	14	42	28	100
El Salvador	F169, F173	1961-1973	6.8 - 5.8	1.0	1	18	69	12	100
Guadeloupe	F176, F178	1963-1970	5.8 - 4.6	0.8	1	11	47	42	100
Guatemala	F183, F190	1964-1973	6.4 - 5.7	0.7	10	25	39	26	100
Martinique	F210, F212	1963-1970	5.4 - 4.6	0.8	*	*	36	64	100
Nicaragua	F219, F220	1963-1970/71	6.7 - 6.0	0.7	23	42	35	*	100
Panama	F222, F224	1969/71-1975	5.4 - 4.4	1.0	9	25	42	23	100
Puerto Rico	F237, F245	1966-1974	3.7 - 2.9	0.8	6	29	26	39	100
Trinidad & Tobago	F249, F251	1965-1975	4.5 - 3.1	1.4	10	23	44	23	100
US Virgin Islands	F253, F255	1965-1974	5.7 - 3.0	2.7	5	45	41	9	100
SOUTH AMERICA									
Brazil	F117A, F117B	1970-1976	5.4 - 4.4	1.0	1	36	36	27	100
Chile	F120, F122	1965-1975	4.7 - 3.0	1.7	2	13	52	33	100
Colombia	F123, F126	1960/64-1969/70	7.0 - 5.8	1.2	6	13	58	23	100
	F126, F129	1969/70-1975/76	5.8 - 4.6	1.2	8	22	43	27	100
	F123, F129	1960/64-1975/76	7.0 - 4.6	2.4	7	18	50	25	100
Guyana	F191, F192	1961-1970	6.0 - 5.0	1.0	20	24	41	14	100
Paraguay	F226, F227	1960-1972	6.6 - 5.9	0.7	2	31	47	20	100
Peru	F229, F230A	1965-1975	6.4 - 5.6	0.8	22	41	26	11	100
Venezuela	F259, F268	1965-1974	6.5 - 5.0	1.5	6	28	46	20	100

Note: Table includes only countries or areas with available data experiencing declines in total fertility exceeding 0.3. Of 25 countries or areas with reliable data, 19 experienced decreases greater than 0.3; 4 experienced decreases of less than 0.3 or no change; and 2 experienced increases. For age-specific fertility rates in these countries, see Table A11, p. M-154.

*Fertility in this age group increased; see Table A11, p. M-154.

children, pregnancy was more common and contraceptive use far less common. Of currently married 20-24 year olds with two children, 14 percent were pregnant and only 24 percent were using contraceptives; of those with one child, 16 percent were pregnant and only 12 percent were using contraceptives (139).

This pattern of early sexual activity and childbearing followed rather rapidly by contraceptive use may be evolving out of conflicting forces common in Latin America. On one hand is cultural and social pressure on young women to prove themselves and perhaps obtain a husband by having children early. These pressures are reinforced by traditional attitudes that value innocence of sexual matters — including contraception — in young women but value sexual prowess and experience in young men. In addition, the disapproval by the Catholic Church of any birth control method other than periodic abstinence may restrict young women's use of effective contraceptives like the pill (216, 232). On the other hand is economic pressure on young women to control their fertility in order to assure for themselves and their children the reasonable standard of living that is becoming increasingly possible for those with few children. This pressure would seem especially apparent to women in consensual unions, where the woman is almost always responsible for her own support and for the support of her children, who usually live with her or are cared for by her female relatives (178, 206).

Two Mexican Sisters Tell about Marriage

In a Zapotec Indian village two married sisters told Perdita Huston what marriage and fertility mean to them:

Tell me, at what age did you marry?

Nineteen. (Maria-Louisa)

Seventeen. (Sophia)

And how did you meet your husbands?

We knew each other in school. Then afterwards, when we left school we would see them when we went out to do errands. At the river, when we did the washing, we would see them. The boys would happen to be there and we would talk with them . . .

Maria-Louisa explained:

One day my husband just asked me to come and live with him so I packed my things and went to his house, with his parents. I was lucky because I married soon; my mother-in-law liked me very much. She told my husband, "You should marry this girl." Within a year we were married.

Her situation was different, Sophia said:

My mother-in-law didn't like me. She didn't want us to get together so she made a lot of trouble. She wouldn't give me anything to eat; she wanted to starve me out of the house. After the first child was born I left and came back to my mother's house. My husband waited for five years to come and get me. After another year we got married.

How many children do you have now?

Seven.

And you, Maria-Louisa?

Ten in all. Six are still in the house; three have married; another died of measles.

Do you want to have more children?

No, life is too difficult now.

Then what do you think is a good number of children to have per family?

If I could choose I would say one or two. Now I know there is a way of choosing but I didn't know that before, so what good does it do anymore? Look at us, how old we look at just 40 years. That is because we have to work so hard for all these children. And there isn't enough food for all of us. If I had known in 1960 what I know now, I wouldn't have had all those children. And my husband would agree, I know.

Do you ever mention that to your husband?

Yes, I've said, "Listen, if only we had known before, we could have done something but now — it is too late!" What can we do?

Do you think that most husbands in this village would permit their wives to control the number of pregnancies?

Heavens, no. Few would even think of it. They say terrible things about women who want it. Some say, "The only reason you want birth control is so you can come and go, and go with other men." They think we will just go and do it with another man . . . like that . . . for no good reason. (105)

Costa Rica's total fertility decline has been accelerated by the wide availability of contraceptives through an extensive national family planning and maternal/child health program. Two of every five women exposed to pregnancy and not relying on sterilization receive contraceptives through the program. Less than 5 percent of the program users, however, are aged 15-19 (212). The program does not exclude young or unmarried women, but the association of family planning with maternal and child health centers may create the impression that family planning is appropriate only for women who have had children. In addition, national advertising for the program is aimed at women with children (324). Commercial sources of contraceptive supplies, which might be more readily utilized by unmarried women, could not officially provide oral contraceptives without prescription before 1975 (232), thus further inhibiting the access of young women to effective contraception.

Young, unmarried women in many Latin American countries face special difficulty obtaining contraceptives even while their incentive to control fertility is strong. The result is reflected in abortion statistics. A 1968-71 study of five cities found that abortion ratios (abortions to live births) were considerably higher for single women than for married women and were highest among women age 15-19 (83). Also, abortion rates (abortions per 1,000 women) during the period increased most rapidly among women age 15-19 (83, 288).

In the mid-1970s Costa Rica's family planning program recognized the need to educate young women about sexuality and contraceptive use even before they become mothers. Among the objectives of the National Family Planning and Sex Education Program is the addition of sex education to the curricula of primary and secondary schools:

> To carry out integral sexual education programs, as an essential part of the basic education of all individuals, hence not limited to a simple impersonal instruction at the level of genital anatomy and procreation physiology, but extended to the ample and inevitable psychological, familial, ethical, physiological, anthropological, demographic and spiritual problem covered and demanded by sexuality (268).

In short, the meager decline in fertility among 15-19 year olds in Costa Rica, which is typical of much of Latin America, may stem from the pattern of early consensual unions and childbearing plus the lack of adequate family planning services for unmarried women. In a sense, having a first child may be the admission ticket to maternal and child health services that provide family planning. Latin American women, many of whom bear much of the burden for child support themselves, are keenly aware of the economic and social pressures that child rearing imposes and turn to fertility control as soon as it is available.

OVERVIEW OF REGIONAL DATA

The first and most obvious conclusion to be drawn from this overview of age at marriage and fertility is that both age at marriage and total fertility rates differ greatly from one part of the world to another — and indeed from one country to another. It is also clear that the relationship between age at marriage and fertility is different in different parts of the world — and, again, in different countries and even within countries — depending on other demographic factors, definitions of marriage, prevailing cultural patterns, socioeconomic changes, and use of birth control methods.

In general, as Table 1 shows (see p. M-106), East Asia has by far the lowest prevalence of early marriage and the lowest fertility as well as the highest percentages of women economically active (at ages 20-24) or in school and the highest percentage of population in urban areas. Latin America ranks second in every respect except economic activity of women, where Africa is second. With respect to other variables, Africa has the second highest prevalence of early marriage, close to that of the Indian subcontinent, the highest early and total fertility rates, and the lowest percentage of women in school and of urban population. Unfortunately much of the African data are less current than data from Asia and Latin America.

Other interregional comparisons are more tenuous. On the whole, the Middle East has slightly higher total fertility than might be expected from a relatively high age at marriage, whereas the Indian subcontinent, especially India itself, has somewhat lower total fertility than might be expected from a relatively early age at marriage. The somewhat lower than expected fertility in relation to age at marriage in the Indian subcontinent and in relation to socioeconomic factors in Southeast Asia may well be due to extensive family planning programs, while the higher than expected fertility in the Middle East may be due to severely restricted economic opportunities for women.

Within each region, of course, there are exceptions, such as Sri Lanka, which is closer to the East Asian pattern than to the rest of the Indian region. The African island state of Mauritius, which is not included in the tabulations for Africa, has fertility levels comparable to those of East Asia (201).

Among 80 developing countries of over one million population with data available on trends in fertility and marriage, there are 26 countries where total fertility has declined appreciably† (166; also see Tables A5, A7, and A11, pp. M-153–M-155).

East Asia
China
***Hong Kong**
South Korea
Taiwan
Southeast Asia
***Indonesia**
***Malaysia**
***Philippines**
***Singapore**
Thailand

Indian Subcontinent
India
***Sri Lanka**
Middle East
Iran
***Tunisia**
Turkey

Latin America
*Brazil
Chile
Colombia
Costa Rica
Cuba
*Dominican Republic
*El Salvador
Jamaica
*Panama
*Peru
*Trinidad and Tobago
*Venezuela

Boldface: substantial change in proportion ever-married at age 15-19 or at age 20-24, or proportion married at these ages already low.
Asterisk (*): substantial declines in fertility among those age 15-19 or 20-24.

Among these 26 countries, 13 have also experienced recent increases in age at marriage or, like Taiwan and Korea, have already reached a high age at marriage (that is, less than 10 percent married before age 20). These countries are listed above in darker type. In 7 of these 13 countries, declining fertility among women either 15-19 or 20-24 has contributed significantly to the drop in total fertility, confirming the impact of a higher age at marriage in curbing population growth. These seven countries in darker type are marked by an asterisk. (Data on China and Iran are not available.) In two countries — India and Turkey — age at marriage has risen, but fertility declines among young women are minimal.

In the 13 countries listed above that are not in darker type, which include 12 Latin American areas and Thailand, total fertility has declined even though age at marriage has not increased recently. In 7 of these 12 Latin American areas, fertility among women 15-19 or 20-24 fell substantially. The seven are Brazil, the Dominican Republic, El Salvador, Panama, Peru, Trinidad and Tobago, and Venezuela. These also are marked with an asterisk. In three Latin American countries — Chile, Colombia, and Costa Rica — substantial fertility declines have occurred without important contributions from young women. In Thailand, few women marry young, but early fertility is moderately high and has not changed much.

Even where falling fertility rates among young women have contributed substantially to total fertility declines, the fertility rates of older women have dropped faster than those of young women. Only in four Asian, two Middle Eastern, and three Latin American countries has the fertility of young women declined as fast or faster than that of women over 25. These nine countries are:

Hong Kong
Malaysia
Philippines
Sri Lanka

Tunisia
Turkey

Brazil
Panama
Peru

Age at marriage has risen in these countries, except perhaps in Peru and Panama, where data are not reliable. (Age-specific fertility trends are not available for Cuba, Jamaica, and Iran.)

The 13 countries in which fertility has declined more among older women are:

Indonesia
Singapore
South Korea
Taiwan
Thailand

India

Chile
Colombia
Costa Rica
Dominican Republic
El Salvador
Trinidad and Tobago
Venezuela

What distinguishes the 9 countries with more rapid fertility declines among young women from the 13 countries with more rapid declines among older women? Do measures of the quality of life, of opportunities for women, or of government policies affecting women differentiate these two groups of countries? For the most part, no. The proportions of countries with a given attribute are roughly equal in the two groups when rated for a number of factors thought to favor rising age at marriage or declining fertility: heavy out-migration of either males or females, low infant mortality, high rates of urbanization, high rates of female school enrollment or economic activity at age 20-24, and a legal minimum age at marriage of 16 or above (121, 122, 267, 280, 294, 343, 349).

While all countries in both groups now have national family planning programs, there is a difference between programs in the two sets of countries. The countries where fertility has declined faster among *older* women are more likely to have family planning programs which started before 1970 and were rated by Parker Mauldin and Bernard Berelson as moderate or strong (166). While five of the nine countries with larger fertility declines among young women had moderate or strong programs, 12 of the 13 countries with larger fertility declines among older women had such programs. This is not surprising. Most family planning programs have concentrated on serving older women who have had all the children they want. Moreover, as noted, most of the programs in Latin America offer family planning services together with maternal and child health services, which stress the needs of older, high parity, high risk mothers.

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†Appreciable total fertility decline as determined by Mauldin and Berelson (166) or more recent data showing decline of greater than 0.3.

There are six countries where fertility has remained stationary at high levels even though age at marriage is rising. They are Bangladesh, Kuwait (Kuwaiti women only), Morocco, Pakistan, Syria, and Haiti. Family planning programs in these countries as of the early 1970s were either nonexistent or sparse in implementation, according to Mauldin and Berelson's ratings (166).

In the other countries for which data are available, no changes in age at marriage or fertility have been identified.

Table 12. The Effect of Socioeconomic Factors on Age at Marriage: Mean Percentage of Women Age 15-19 Ever-Married in Countries with High and Low Rates[1] for Three Socioeconomic Factors, by Region

		Mean % of Women Age 15-19 Ever-Married in Countries with:		
	Median	High Rates	Low Rates[1]	Difference
ASIA				
Schooling[2] (N=13)	64%	6	37	31
Economically Active[3] (N=14)	42%	6	39	33
Urbanization[4] (N=14)	22%	6	39	33
MIDDLE EAST				
Schooling (N=15)	34%	25	44	19
Economically Active (N=15)	12%	26	39	13
Urbanization[5] (N=13)	35%	31	44	13
AFRICA				
Schooling (N=28)	14%	40	61	21
Economically Active (N=28)	56%	49	56	7
Urbanization (N=22)	11%	47	51	4
LATIN AMERICA[6]				
Schooling (N=23)	72%	15	17	2
Economically Active (N=25)	46%	13	19	6
Urbanization (N=20)	46%	16	18	2
TOTAL				
Schooling (N=79)	46%	15	51	36
Economically Active (N=82)	37%	29	35	6
Urbanization (N=69)	30%	20	46	26

[1] High rates for socioeconomic factors are those above the regional median; low rates are those on or below the regional median. Calculations utilize most recent comparable data for each country on school enrollment, economic activity, urbanization on one hand and percentage of women age 15-19 ever-married on the other.

[2] Gross female school enrollment ratio at the first and second levels. This is the total enrollment of female pupils of all ages at the first and second levels divided by the female population of official school ages for those two levels. Second-level schooling includes general education, teacher training, and other secondary-level vocational-technical training. All ratios are expressed as percentages.

[3] Percentage of women age 20-24 economically active. The International Labour Office defines the economically active population as employers, the self-employed, employees, unpaid family workers, members of producers' cooperatives, members of the armed forces, and unemployed persons with previous job experience.

[4] Percentage of the population living in urban areas, generally defined as cities and towns; national definitions vary.

[5] Data on socioeconomic factor and percentage of women age 15-19 ever-married not available for comparable years from over half of the countries.

[6] The data on proportion of women age 15-19 ever-married in Latin America are not a reliable indicator of the prevalence of unions. Using the age-specific fertility rate of women age 15-19 as an indicator, the mean age-specific fertility rate of women age 15-19 in countries with high rates of school enrollment is 93, with low rates, 103 (N=28); with high rates of economic activity, 86; with low rates, 108 (N=33); with high rates of urbanization, 87; with low rates, 121 (N=33).

Another way to try to determine how the different factors reviewed in this report (school enrollment of women, economic activity of women, and percentage of the population in urban areas) have influenced age at marriage and total fertility rates is through Tables 12 and 13. Both tables divide the countries in each region into those that rank above and below the median value for the whole region with respect to each factor considered. From the tables it is possible to see, in the right-hand column, how much difference each of the factors makes either to age at marriage (see Table 12) or to total fertility rates (see Table 13).

All three factors generally associated with age at marriage — education of women, female economic activity, and urbanization — make about the same difference in Asia and the Middle East. In Africa, female school enrollment rates are linked to age at marriage but economic activity and urbanization are not. In Latin America, age at marriage differs little between countries regardless of differences in these factors. When early fertility rates are used as an index of early unions, urbanization and economic activity both make a difference. For the four regions together, education accounts for the greatest differences in age at marriage, followed by urbanization, while economic activity makes very little difference. (See Table 12.)

Table 13 considers the same three socioeconomic factors plus age at marriage to see which of these four factors make appreciable differences in total fertility rates in each of the four regions. In Asia, all four factors are about equally related to differences in fertility; in the Middle East, age at marriage and schooling are associated with fertility differences between countries, but the association is not as strong as in Asia. Economic activity rates and urbanization are not obviously related to overall fertility in the Middle East. In Africa, both a high age at marriage and a high percentage of women employed are associated with higher, not, as might have been expected, with lower fertility, while neither urbanization nor schooling is associated with differences in fertility rates; in Latin America, schooling and economic activity rates are most strongly associated with fertility differences between countries, while age at marriage and urbanization make less difference. The fertility rates of 15-19 year olds, used as an index of early unions, make about as much difference to total fertility in Latin America as education and economic activity.

LAW AND POLICY

Knowing which socioeconomic factors are associated with lower fertility or with later marriage within a region may be of particular value to policy makers considering policy options. A lack of association, however, may not mean that a policy advocating change would not be successful; often a lack of association is simply the result of lack of change, as in Africa. Yet there is still very little information to answer the specific questions policy makers and legislators ask: Will increases in age at marriage reduce fertility within a given time period in my country? Is marriage reform legislation an effective way to raise actual age at marriage? And finally, what, if any, are the political costs or constraints involved in raising the legal age at marriage?

In a 1974 review of the policy relevance of social science research, William P. McGreevey and Nancy Birdsall concluded that research on the impact upon fertility of age at marriage or type of marriage was inadequate. Attempts to translate any of the research findings into viable public policies with predictable results, time schedules or costs were virtually nonexistent (167). With respect to research on age at marriage, that situation is little changed today.

Clearly there is no single route either to lower fertility or to later marriage as an important determinant of lower fertility. China, for example, which offers the best instance of deliberate government intervention to raise age at marriage and to lower fertility, did not experience either large out-migration of males or rapid urbanization, which were associated with increasing age at marriage and declining fertility in Korea and Tunisia. In Malaysia and Sri Lanka, where later marriage contributed substantially to lower fertility, there was little active government support for late marriage or equality for women. In many Latin American countries where fertility has declined, there has been little apparent delay in marriage or reduction in fertility of women under 20, despite high levels of school enrollment among women.

Table 13. The Effect of Age at Marriage and Socioeconomic Factors on Fertility: Mean Total Fertility Rates (TFR) in Countries with High and Low Age at Marriage and High and Low Rates[1] for Three Socioeconomic Factors, by Region

		Mean TFR in Countries with:		
	Median	High Rates[1]	Low Rates[1]	Difference
ASIA				
Age at Marriage[2] (N=14)	11%	3.4	5.5	2.1
Schooling[3] (N=12)	64%	3.6	5.3	1.7
Economically Active[4] (N=13)	42%	3.3	5.6	2.3
Urbanization[5] (N=13)	22%	3.5	5.3	1.8
MIDDLE EAST				
Age at Marriage (N=16)	32%	6.1	7.0	.9
Schooling (N=16)	34%	6.0	7.2	1.2
Economically Active (N=18)	33%	6.4	6.6	.2
Urbanization (N=13)	39%	6.4	6.7	.3
AFRICA				
Age at Marriage (N=28)	50%	6.5	6.1	−.4
Schooling (N=25)	14%	6.3	6.4	.1
Economically Active (N=31)	53%	6.7	5.8	−.9
Urbanization (N=23)	10%	6.0	6.3	.3
LATIN AMERICA				
Age at Marriage[6] (N=29)	28%	4.4	5.4	1.0
Schooling (N=28)	72%	4.0	5.6	1.6
Economically Active (N=33)	32%	4.0	5.5	1.5
Urbanization (N=23)	23%	4.6	5.3	.7
TOTAL				
Age at Marriage (N=87)	28%	4.7	6.3	1.6
Schooling (N=81)	47%	4.6	6.4	1.8
Economically Active (N=95)	39%	5.2	5.9	.7
Urbanization (N=72)	30%	5.1	6.3	1.2

[1] High rates for socioeconomic factors are those above the regional median; low rates are those on or below the regional median. High ages of marriage are those on or below the regional median percentage ever-married at age 15-19; low ages of marriage are those above the regional median. Calculations utilize most recent comparable data for each country on school enrollment, economic activity, urbanization, and percentage women age 15-19 ever-married on one hand and total fertility rate on the other.

[2] Percentage women age 15-19 ever-married

[3] Gross female school enrollment ratio at the first and second levels. This is the total enrollment of female pupils of all ages at the first and second levels divided by the female population of official school ages for those two levels. Second-level schooling includes general education, teacher training, and other secondary-level vocational-technical training. All ratios are expressed as percentages.

[4] Percentages of women age 20-24 economically active. The International Labour Office defines the economically active population as employers, the self-employed, employees, unpaid family workers, members of producers' cooperatives, members of the armed forces, and unemployed persons with previous job experience.

[5] Percentage of the population living in urban areas, generally defined as cities and towns; national definitions vary.

[6] The data on proportion of women age 15-19 ever-married in Latin America are not a reliable indicator of the prevalence of unions. Using the age-specific fertility rate of women age 15-19 as an indicator, the total fertility rate of countries with age-specific fertility rates of women age 15-19 above the regional median is 5.3, and of countries with age-specific fertility rates of women age 15-19 on or below the median is 3.9 (N=37). Median ASFR of women age 15-19, 101.

Nevertheless, government policies do seem to have an impact on fertility, especially when political leaders demonstrate a strong commitment to social change, including raising the legal minimum age at marriage, establishing effective voluntary family planning programs, and stressing greater participation by women in development.

Chairman Mao Zedong's early commitment to equality for women in China, President Habib Bourguiba's support for an expanded role for Tunisian women, President Suharto's image of stable and respectable family life in Indonesia, and the strong interest of the Shah of Iran and his immediate family in women's issues probably all contributed to changing patterns of marriage among some groups in those countries. In Muslim countries such as Indonesia, Tunisia, and Iran, it is hard to believe that changes would have occurred without such leadership from the top.

A closer look at the political processes in both China and Indonesia suggests, however, that any government needs to move carefully if it seeks to induce changes that affect both personal lives and religious authority as much as laws on marriage may. In China, as noted, the Marriage Law of 1950 set a legal minimum age of 18 for women and 20 for men, at that time the highest minimums in the world. But despite continuing efforts by some public health leaders to raise the minimums still further and despite what amounted to government insistence that marriages be postponed three to five years beyond the legal minimum, the law has not been changed for 20 years, while the government pursued less direct measures, intended to build a climate in which later marriage was acceptable. A clear distinction was made between the legal minimum age set in legislation and the optimal age from the point of view of individual and social objectives, which was always several years older (247).

In Indonesia, there was at first strong Muslim resistance to the possibility that marriage might come under civil rather than religious jurisdiction. Compromise was needed before the marriage laws could be promulgated in 1974 or implemented in 1977. Basically, President Suharto agreed that there would be no change in the substance of Muslim law but that, to prevent arbitrary applications of the law, there would be new procedural protections. In effect, marriages below the minimum age, divorce, and polygamy now require consent of both parties in formal proceedings before the Muslim courts. In this way, without actually prohibiting marriage below 16 for women or 19 for men or prohibiting divorce (except divorce by repudiation), the law made it more difficult and more costly for men to deviate from the desired norms. Because the procedures are enforced by expanded Muslim courts, the religious leaders were satisfied. Because the women's groups, marriage counselors, and family planning organizations could work at the local level to support the basic standards set in the law, these reformist elements also were satisfied (133).

The Indonesian pattern of compromise may be relevant to other efforts to change age at marriage and marriage customs. As June and Ronald Katz point out:

> Some of the reasons for this success may well apply to other potential social legislation both in Indonesia and in other developing countries. At a minimum, it appears that the following factors will facilitate social reform and that their absence will inhibit it:
>
> - Moderation — it may be counterproductive to go too roughly against the grain of a traditional society; encouraging modernist trends which already exist in a small way may be much more effective.
> - Allowances for diversity — it was impossible to legislate unity in a multi-cultural society in one stroke; the best that can be done to foster unity and avoid divisive backlash is to pass a law which lays a groundwork for unity but which does not directly challenge deeply felt cultural and religious differences.
> - Constructive political symbolism — if, as in this case, substantive legal change is impossible because of religious belief, it is helpful to make a virtue out of the use of procedure; if the image of procedural change is used artfully, the populace may well accept it even if in effect the change is substantive.
> - Grassroots persuasive communication — it is crucial that there be government agencies and private organizations with a real stake in the legislation and the ability to effectively translate that stake into effective local political action (133).

In Kenya, on the other hand, the male-dominated legislature has three times rejected a marriage reform bill which, like the Indonesian law, would require the first wife's permission before a man takes additional wives. A provision prohibiting wife-beating was deleted after one member observed that beating wives "taught them politeness" (297). Eventual passage of the Kenya bill may depend on how much support women can mobilize for it. Clearly, changing the rights of men and women in marriage is more controversial in Kenya than family planning, which has been provided by government health centers since 1967 (201).

Only a few countries have actually set age at marriage at a level sufficiently high to have any effect on fertility. Even in these countries, age at marriage was rising before legislation was enacted. In Tunisia, for example, the mean age at marriage for women was 19.5 in 1956, eight years before a law was passed establishing the minimum at 17 (240). Since 1956, the age at marriage has continued to increase fairly steadily until, in 1975, it was 23.3 (73). Other countries, such as Malaysia and Sri Lanka, also experienced increases in the actual age at marriage long before legal changes were approved.

Despite the actions that a number of governments have taken since 1950, the median legal age at marriage throughout the world is 15 (see Tables 14 and 15). In Europe the recent trend has been to set the same legal minimum age for men and women. In Africa and Asia the minimum has usually been raised to 18 for men and 16 for women (197). A few Middle Eastern countries have passed similar laws, but in most of the Arab countries age at marriage is still governed by Muslim law, which allows girls to marry at the age of menarche, or about 12 or 13. Likewise, in Latin America, although six countries have raised the minimum age at marriage to 16 for women, marriages at about the age of menarche are legal in eight countries. Regardless of these legal differences, however, the percentage of women ever-married at 15 to 19 in countries where the legal age is over 15 — 32 percent — does not differ markedly from the percentage ever-married in countries where the legal age is 15 or less — 37 percent (see Table 14).

Table 14. Mean Percentage of Women Ever-Married at Ages 15-19 in Countries Above and On or Below the Median Legal Age at Marriage of 15, by Region

	% of Women Age 15-19 Ever-Married in Countries with Legal Minimum Age at Marriage:	
	Above 15	**On or Below 15**
Asia	21 (N=10)	44 (N=2)
Middle East	39 (N=9)	28 (N=4)
Africa	55 (N=11)	56 (N=8)
Latin America	13 (N=4)	18 (N=17)
Total	32 (N=32)	37 (N=31)

In addition to the political constraints on marriage legislation in all settings, enforcement of a legal minimum would be difficult in most societies. First, enforcement requires an effective registration system, so that exact ages are known. Secondly, it requires a great deal of social control and administrative efficiency. Thirdly, it requires institutions at the grass roots level, whether civil or religious, that are willing to play an active role in enforcement. In general, the problem of noncompliance has been dealt with either by granting exceptions or by abandoning any attempt to enforce the law. In Iran, a clause was included in the Marriage Law which permitted exemptions for the "proper reasons," which remained undefined. Reportedly the law was rarely observed (170). Few nations in the developing world today would be able to implement delayed marriage policies as stringent as the People's Republic of China's, for instance.

Age at Marriage and Fertility Control

With or without specific legislation or political backing, late marriage has been a factor in the past in reducing fertility. But the introduction and worldwide dissemination of safe, effective methods of voluntary fertility control have added another dimension to the issue. While later marriage will undoubtedly become more common, especially in the countries where age at marriage today is early, and while later marriage will bring benefits both to women and to society as a whole, later marriage as a factor in population growth should no longer be viewed in isolation from the increasing use of deliberate means of fertility control. As young men and women try to adjust to the great social and economic changes now underway in every country, both marriage patterns and contraceptive usage patterns will be affected, often in close interaction with one another.

On one hand, social and behavioral change is likely to diminish the importance of age at marriage to population growth, while, on the other hand, the demographic momentum of previous growth will amplify the impact of changes in age at marriage. There are at least three reasons that a rising age at marriage is having less impact on fertility now than it did in Europe and Asia in the past:

- In nearly all countries where fertility is falling sharply now, these declines are taking place primarily among women over age 25 — most of whom are married and therefore presumably using birth control measures.
- In a growing number of countries, marriage does not always signify the initiation of female sexual activity. Thus an increase in age at marriage in these areas will not

Table 15. Minimum Legal Age at Marriage With Parental Consent, by Country

Region and Country	Ref. No.	Date Reported	Date Enacted	Minimum Legal Age Male	Minimum Legal Age Female
ASIA					
Australia	197	1977	1975	18	16
Bangladesh	13	1979		18	15-16
China, P.R. of	39	1975	1950	20	18
Fiji	197	1977	1968	18	16
Hong Kong	197	1977	1975	16	16
India	3	1978		21	18
Indonesia	197	1977	1974	19	16
Japan	257	1976		18	16
Korea, Rep. of	149	1958		18	16
Malaysia	197	1977	1975	18	18
Nepal	197	1977	1975	18	16
New Zealand	257	1975		16	16
Papua New Guinea	197	1977	1964	18	16
Philippines	257		1972	16[a]	14[a]
Singapore	197	1977	1961	18	18
Sri Lanka	2	1979	1978	18	16
Thailand	197	1977	1976	17	17
Tonga	197	1977	1967	15	15
Western Somoa	197	1977	1961	18	16
MIDDLE EAST					
Afghanistan	334	1979	1978	18	16
Algeria	197	1977	1963	18	16
Cyprus	257	1976		18	16
Egypt	257	1974		18	16
Iran	1	1979		[b]	[b]
Iraq	308	1979	1978	18[c]	18[c]
Israel	257	1975		None	16
Jordan	257	1976		18	17
Kuwait	142	1979		None	None
Lebanon	66	1975		18[d]	12½-18[d]
Libya	151	1979		None	16
Morocco	197	1977		None	None
Saudi Arabia	215	1979		13[e]	13[e]
Sudan	233	1979		None	None
Tunisia	197	1977	1974	20	17
Turkey	257	1975		17	15
Yemen Arab Republic	308	1979		18	16
AFRICA					
Benin	304	1979		None	None
Cameroun	197	1977	1966	18	15
Central African Republic	31	1979		18	16
Ethiopia	322	1976		18-20[f]	12-15[f]
Gabon	320	1979		18	15
The Gambia	308	1979		None	None
Ghana	308	1979		None-21[f]	None-21[f]
Guinea	88	1979		18	17
Kenya	308	1979		15-18	9-18
Lesotho	197	1977	1974	18	16
Liberia	197	1977	1973	16	16
Madagascar	308	1979		17	14
Mali	197	1977	1963	18	15
Mauritius	197	1977	1976	18	15
Niger	182	1979		18	16
Nigeria	308	1979		9-16[f]	9-16[f]
Senegal	197	1977	1972	20	16
Sierra Leone	308	1979		None	None
Somalia	197	1977	1975	None	16
S. Africa	197	1977	1961	18	16
Swaziland	197	1977	1964	18	16
Tanzania	197	1977	1971	18	15
Uganda	197	1977	1973	18	16
Zambia	308	1979		16[g]	16[g]
LATIN AMERICA					
Argentina	197	1977	1970	18	16
Barbados	197	1977	1974	16	16
Bolivia	257	1966		14	12
Brazil	208	1975		18	16
Chile	236	1975		14	12
Colombia	197	1977	1974	16	14
Costa Rica	257	1974		15	15
Cuba	197	1977	1975	16	14
Dominican Republic	257	1975		16	15
Ecuador	257	1975		14	12
El Salvador	197	1977	1976	16	14
Grenada	197	1977	1966	16	16
Guadeloupe	257	1970		18	15
Guatemala	257	1972		16	14
Guyana	257	1964		16	14
Haiti	91	1979		None	None
Honduras	257	1976		14	12
Jamaica	257	1964		16	16
Martinique	257	1970		18	15
Mexico	53	1975		16	14
Neth. Antilles	257	1972		18	15
Nicaragua	257	1977		15	14
Panama	337	1977	1961	18	16
Paraguay	257		1976	14	12
Peru	257		1972	16	14
Trinidad/Tobago	308	1978		16-18	12-14
Venezuela	257	1974		14	12
EUROPE, US & CANADA					
Austria	137	1973		19	16
Belgium	257	1975		18	15
Bulgaria	197	1977	1975	18	18
Canada	257	1977		14-16[f]	12-16[f]
Czechoslovakia	197	1977	1975	18	18
Denmark	197	1977	1976	18	18
Finland	197	1977	1976	18	17
France	197	1977	1974	18	15
E. Germany	197	1977	1975	18	18
W. Germany	197	1977	1975	16	16
Greece	257	1975		18	14
Hungary	138	1974		16[h]	14[h]
Iceland	257	1976		18	18
Ireland	197	1977	1974	16	16
Italy	197	1977	1972	16	16
Luxembourg	257	1976		18	15
Malta	257	1976		16	14
Netherlands	197		1976	18	16
Norway	197		1969	18	18[i]
Poland	333	1979	1977	16	16
Portugal	197	1977	1975	16	14
Romania	257	1976		18	16
St. Vincent	197	1977	1966	16	15
Spain	256	1974		14-16	12-14[j]
Sweden	197	1977	1976	18	18
Switzerland	257	1976		20	18
USSR	257	1976		18	17-18[k]
UK: Eng., Irel., Wales	149	1969		16	16
UK: Scotland	257	1976	1976	16	16
US	160	1979		14-18[l]	13-17[l]
Yugoslavia	197	1977	1975	18	18

[a] The Muslim Code of Personal Laws, passed February 4, 1977, sets the minimum legal age at marriage for Filipino Muslims at 15 for males and at the age of puberty, presumed to be 15 years, for females (334).

[b] There have been conflicting reports concerning Iran. The Colombo *Sun* of March 31, 1979 reported that the minimum is now 15 for women and 18 for men. Other reports, however, have indicated that the minimums are 13 and 15 respectively.

[c] In special cases, permission may be granted to marry at age 15.

[d] Varies according to religion

[e] By Islamic Law

[f] Varies by civil division, ethnic, or religious group

[g] With permission of the court

[h] With permission of Public Guardianship Authority

[i] Under the age of 18, the permission of the king is required.

[j] Dependent on whether it is a civil or canonical marriage

[k] 17 pertains to the Ukraine only.

[l] Varies by state

automatically mean a comparable postponement of sexual activity and first births. The higher age at marriage rises, the less likely it is to mark the beginning of sexual activity.

- Finally, as age at marriage increases, countries will almost certainly experience at the same time an increase in the availability and use of contraceptives which, whether used by older or younger women or within or outside marriage, will make increasingly important contributions to any fertility decline. In nearly all countries where increase in age at marriage has been an important factor in declining fertility, much of this increase occurred before effective methods of birth control were widely available.

By contrast, there is a very important reason that, for the last two decades of the 20th century at least, age at marriage may remain an influential factor in the demographic equation:

- During the 1980s and the 1990s there will be more young adults in their peak reproductive and marriageable years (age 15-29) than ever before in history. More than 40 percent of the population in developing countries today are under 15 years old. By 1990, there will be 40 percent more potential parents age 15-29 than there were in 1975, and more than twice as many as in 1960 — in other words, a total of more than one billion potential husbands and wives, fathers and mothers (62, 331) (see Table 16). If this new generation marries young and then begins to reproduce at an early age, it will be difficult for many countries to reduce population growth to the desired levels even if marital fertility is sharply reduced (150).

With these facts in mind, national leaders and policy makers should not diminish their support for marriage reform, for more equal participation by women in national life, or for extensive family planning programs, but rather should note that changes in age at marriage and age at first birth are an integral part of the process of social change for this new generation in much the same way that lower fertility rates are.

For better or worse, members of this populous new generation will not be willing to follow unquestioningly in the pathways of their parents. They will be better educated, more urban-oriented and probably more demanding of higher standards of living and a voice in policy decisions that affect them. But many will undoubtedly welcome legislation and policies, like the Indonesian marriage law, for instance, or the Korean family planning program, which adapt secular modern ideas or technologies to a traditional culture that is familiar and respected. Some of the legislative measures or policies that would help to meet the needs of these young people and might at the same time delay marriage and/or childbearing until young men and women are ready for it would be:

- Education that not only ensures basic literacy for all, regardless of sex, but also provides realistic training in income-generating activities for women. Adequate training can help both men and women to perform better the tasks that need to be done, including growing crops, raising animals, preparing and storing food, making cloth and healthful foods, providing primary health care, and building and maintaining various community facilities. Such training would necessarily extend at least to age 16, often later, and would open up more income-generating opportunities, especially for women, than would education providing training only for a limited number of white collar industrial or government jobs.
- More employment opportunities for women, including work married women can do even if they have one or two children to care for, so that women will no longer be forced to choose *either* marriage and large families *or* outside employment, but rather will be able to combine marriage, small families, and income-generating work as needed or desired. Also, governments should endeavor to employ more women in the white-collar jobs, especially in the fields of health and education, that women seek. Government employment of women may encourage changes in attitudes that often have confined women to low-level jobs.

Table 16. Young Adult Population (Aged 15-29), by Region of the Developing World (in millions)

	1960	1975	1990
China	158.7	230.9	273.8
East and Southeast Asia	66.4	93.2	147.6
Indian Subcontinent	151.6	212.8	328.3
Middle East	36.2	55.4	87.8
Africa	58.3	83.3	127.5
Latin America	54.0	85.8	130.7
Total	525.3	761.4	1095.8

Source: Adapted from Demeny (62). In this table East and Southeast Asia are combined; Burma and Pakistan are included in the Indian Subcontinent; Sudan is included in Africa, not the Middle East; and countries with populations of less than .5 million are excluded.

- Policies requiring that men and women both share in the care and support of any children they bring into the world. For example, in the Middle East, women should be encouraged to help in producing income for the family whereas in Latin America men should be required to support their natural children. In modern times of economic stress often one parent alone cannot support a family, and both should be encouraged to share these responsibilities between them whether living together or separately.
- Public discussion leading to a clear legal minimum age at marriage, no less than 18, to prevent child marriage and discourage adolescent pregnancies. Both individuals and families should come to recognize that marriage is a serious responsibility meant for adult men and women, not an exchange of female "property" or merely a contract between two families.
- Public recognition that later marriage and family planning require support and sometimes self-restraint on the part of men as well as women. To expect women to delay marriage and practice abstinence while men's sexual activity outside marriage is condoned or even encouraged is unrealistic. As Mao Zedong put it:

  > What sort of chastity is this, completely confined to women, with shrines for female martyrs everywhere? Where are the shrines for chaste boys? (293)
- Provision of information to betrothed couples or education for all young people, making them aware of the heavy responsibilities involved in bringing children into the world and of the ways to space and limit family size so as not to overtax their own health and resources and endanger the well-being of their children.
- Available confidential services or relatively anonymous commercial supplies of contraceptives so that young people, even if unmarried, will not be embarrassed about or excluded from obtaining contraceptives to control their

fertility and will be able to avoid bringing unwanted children into the world.

- Convenient access to family planning services for young and old alike, including methods like the pill and IUD for women who want to space children, sterilization for those who want no more children. condoms and spermicides from commercial outlets for men and women of all ages who prefer to use these sources, and safe termination of pregnancy for those who need this service.
- A voice for women in marriage decisions, including whether and when to marry, choice of mate, divorce, inheritance rights, and, where applicable, polygamy.

Government policies that guide and help young people of both sexes to make marriage and fertility choices in an intelligent, informed, and responsible way will, in the long run, not only be the best way to raise age at marriage and lower fertility to appropriate levels; they will also be the best way to support constructive economic and social development.

A supplement consisting of complete tables listing the data on marriage and fertility used in this report ana the sources of these data is available on request from the Population Information Program, The Johns Hopkins University, 624 North Broadway, Baltimore, Maryland 21205, USA.

Marriage data are drawn from UN Demographic Yearbooks (255, 256), UNECA (258), UNECWA (259), country surveys (8, 14, 29, 43, 45, 52, 54, 70, 73, 78, 98, 99, 108, 124, 157, 181, 189, 193, 229, 234, 251, 300), CICRED reports (76, 115, 217, 228), US Bureau of the Census Country Demographic Profiles (272, 274, 277, 278), and Blayo (18). Data on fertility rates, with a few exceptions, are drawn from the compendium of estimates based on country surveys, censuses, and vital statistics compiled by the US Bureau of the Census (271). Data have been adjusted by various methods for underreporting of births and/or base population. For purposes of this report, estimates made by similar methods were chosen wherever possible to reflect best trends within countries. The accuracy of the estimates varies widely from country to country and for different years.

TABLES

Table A5. Age-Specific and Total Fertility Rates, 1960s and 1970s, Asia

Country	Source Code[a]	Year	Age Group 15-19	20-24	25-29	30-34	35-39	40-44	45-49	TFR
EAST ASIA										
Hong Kong	F8	1965	41	252	318	211	122	39	3	4.9
	F9	1970	18	155	233	169	87	31	5	3.5
	F11	1975	18	122	207	123	60	19	3	2.8
Japan	F21	1965	3	112	203	86	19	3	0	2.1
	F22	1974	5	115	200	79	17	2	0	2.1
Korea, Rep. of	F23	1960-61	31	249	338	277	221	124	16	6.3
	F23B	1970	9	184	322	225	112	43	7	4.5
	F25	1975	8	177	266	158	74	37	11	3.7
Taiwan	F50	1965	36	261	326	195	100	41	6	4.8
	F51	1975	37	194	215	83	27	8	2	2.8
SOUTHEAST ASIA										
Indonesia	F15	1967-70	146	268	271	207	137	61	23	5.6
	F16	1971-75	127	265	256	199	118	57	18	5.2
Java-Bali[b]	F17	1967-70	145	256	255	191	127	54	21	5.3
	F18	1971-75	130	254	240	183	106	51	16	4.9
	F19	1966-70	152	254	251	204	140	(60)[c]	(20)[c]	5.4
	F20	1971-75	105	238	221	168	108	51	20	4.6
	F20A	1976	119	256	221	154	86	41	18	4.5
Malaysia. West	F26	1960	125	278	323	257	154	85	(—)[d]	6.1
	F27	1965	80	262	303	241	156	67	20	5.6
	F28	1970	57	235	276	225	143	58	16	5.1
	F32	1975	47	187	238	184	124	46	9	4.2
Philippines	F35	1963-67	74	254	313	281	216	101	20	6.3
	F36	1968-72	56	227	302	272	199	100	22	5.9
Singapore	F41	1965	36	227	260	216	138	55	8	4.7
	F42	1970	26	139	209	138	75	27	4	3.1
	F45	1977	14	93	142	87	29	7	1	1.9
Thailand	F54	1965-69	70	250	290	260	210	150	20	6.2
	F57	1970-74	70	220	220	180	170	80	30	4.9

Table A5. Continued

Country	Source Code[a]	Year	Age Group 15-19	20-24	25-29	30-34	35-39	40-44	45-49	TFR
INDIAN SUBCONTINENT										
Bangladesh	F1	1963-65	276	359	356	260	150	56	22	7.4
	F2	1974	198	337	311	262	197	95	14	7.1
	F3	1971-75	111	289	291	250	185	107	35	6.3
India	F13	1968-69	102	258	269	225	164	79	37	5.7
	F14	1971-72	89	260	261	215	141	74	29	5.3
Sri Lanka	F46	1953	77	290	330	275	168	43	8	5.9
	F47	1963	53	232	284	244	160	47	7	5.1
	F48	1971	43	177	229	203	140	43	7	4.2
	F49	1974	31	146	161	158	126	43	6	3.3

[a] Codes refer to source information listed in Table A3 of supplement, available on request.
[b] Alternative calculations presented.
[c] Estimates
[d] Not known whether excluded from calculation or included in 40-44 age group.

Table A7. Age-Specific and Total Fertility Rates, 1960s and 1970s, Middle East

Country	Source Code[a]	Year	Age Group 15-19	20-24	25-29	30-34	35-39	40-44	45-49	TFR
Bahrain	F62	1965-71	129	336	357	263	189	64	39	6.9
	F63	1971-76	94	260	324	249	171	52	31	5.9
	F64	1976	85	217	301	242	173	49	29	5.4
Egypt	F65	1966	35	205	341	282	240	110	53	6.3
	F66	1973	24	173	264	237	207	95	46	5.2
Jordan[b]	F70	1961	112	319	356	337	205	63	12	7.0
	F71	1974	98	249	324	268	261	95	28	6.6
Kuwait	F73	1965	150	347	399	308	230	71	—	7.5
	F75	1975	128	349	383	288	214	54	22	7.2
Morocco	F78	1962	96	304	310	293	186	107	42	6.7
	F79	1973	74	327	379	322	233	116	30	7.4
Pakistan[c]	F81	1963-65	130	303	373	353	250	114	67	8.0
	F82	1974-75	119	305	360	302	234	107	9	7.2
Tunisia	F87	1966	78	297	349	316	242	121	46	7.2
	F88	1971	40	253	310	280	214	102	30	6.1
	F89	1976	65	237	310	253	176	95	31	5.8
Turkey	F90	1966-67	81	269	260	209	150	60	33	5.3
	F91	1973	64	264	264	205	137	40	10	4.9

[a] Codes refer to source information listed in Table A7 of supplement, available on request.
[b] Includes West and East bank. Rates are suspect because of age misstatement and international migration.
[c] Due to statistical methods used, 1974-75 data are not directly comparable with 1963-65 data shown.

Table A11. Age-Specific and Total Fertility Rates, 1960s and 1970s, Latin America

Country or Area	Source Code[a]	Year	Age Group 15-19	20-24	25-29	30-34	35-39	40-44	45-49	TFR
CARIBBEAN & CENTRAL AMERICA										
Bahamas	F98	1968	74	209	171	130	95	35	6	3.6
	F100	1974	78	178	140	108	64	23	5	3.0
Barbados	F101	1960	135	243	236	186	104	39	4	4.7
	F106	1965	113	181	199	149	114	37	4	4.0
	F111	1973	97	166	184	105	57	20	3	3.2
Costa Rica	F131	1963	117	329	352	287	219	97	16	7.1
	F141	1973	92	199	185	138	99	48	9	3.9
	F143	1975	107	210	173	122	89	40	8	3.7
Dominican Republic	F159	1967	176	341	319	299	220	106	[11][b]	7.4
	F166	1973-74	113	286	246	208	166	52	7	5.4
El Salvador	F169	1961	144	324	328	273	189	73	20	6.8
	F170	1966	144	330	289	239	204	65	35	6.5
	F173	1973	143	290	264	210	171	69	20	5.8

Table A11. Continued

Country or Area	Source Code[a]	Year	Age Group 15-19	20-24	25-29	30-34	35-39	40-44	45-49	TFR
Guatemala	F183	1964	146	297	296	244	188	83	23	6.4
	F189	1972	140	280	277	241	174	89	21	6.1
	F190	1973	133	265	262	228	164	77	19	5.7
Guadeloupe	F176	1963	59	234	296	257	197	99	11	5.8
	F178	1970	57	209	251	195	136	67	8	4.6
Honduras	F196	1961	155	323	344	295	220	93	23	7.3
	F197	1971-72	165	307	336	295	218	123	18	7.3
	F198	1974	159	295	323	283	209	118	17	7.0
Martinique	F210	1963	48	200	285	265	195	92	13	5.5
	F212	1970	51	215	264	189	132	62	8	4.6
Mexico	F213	1960	105	301	316	272	201	69	29	6.5
	F214	1965	103	297	318	248	227	99	43	6.7
	F215	1970	90	281	317	270	200	98	53	6.5
	F218A	1973-75	105	290	302	256	178	83	17	6.2
Nicaragua	F219	1963	148	349	356	238	166	75	12	6.7
	F220	1970-71	101	263	280	241	192	90	33	6.0
Panama	F221	1959-61	152	310	290	201	129	42	8	5.7
	F222	1969-71	142	291	264	197	130	46	9	5.4
	F223	1973	127	241	223	160	111	40	7	4.6
	F224	1975	123	239	220	154	98	33	7	4.4
Puerto Rico	F237	1966	90	215	188	121	85	30	7	3.7
	F245	1974	80	169	170	98	45	14	2	2.9
Trinidad & Tobago	F249	1965	105	245	233	163	114	32	5	4.5
	F251	1975	77	181	164	113	63	22	4	3.1
US Virgin Islands	F253A	1965	154	399	279	175	92	39	3	5.7
	F255	1974	129	155	131	102	61	20	5	3.0
SOUTH AMERICA										
Argentina	F94	1955	60	161	175	119	78	30	7	3.2
	F95	1960	58	165	169	119	69	29	6	3.1
	F96	1965	57	154	162	114	67	24	5	2.9
	F97	1970	67	163	174	121	69	26	7	3.1
Bolivia	F114	1960	77	234	276	259	220	117	40	6.1
	F115	1975	77	254	356	300	215	103	57	6.8
Brazil	F116	1960-70	90	244	275	226	148	72	21	5.4
	F117A	1970	76	252	261	214	157	89	29	5.4
	F117B	1976	74	182	210	194	135	67	20	4.4
Chile	F119	1960	79	218	255	234	149	63	14	5.1
	F120	1965	79	218	232	198	143	62	10	4.7
	F121	1970	79	184	175	129	90	43	8	3.5
	F122	1975	74	173	149	103	67	29	5	3.0
Colombia	F123	1960-64	129	299	337	304	230	98	10	7.0
	F124	1965-66	125	270	321	267	214	95	10	6.5
	F125	1967-68	110	210	278	277	176	85	10	6.0
	F126	1969-70	114	267	283	219	173	110	0	5.8
	F127	1971-72	111	257	241	193	141	90	0	5.2
	F128	1973-74	101	227	211	160	118	55	11	4.4
	F129	1975-76	94	212	221	172	132	53	31	4.6
	F130	1978[c]	54	186	202	156	105	60	20	3.9
Ecuador[d]	F167	1966	94	290	303	240	215	92	32	6.3
	F168	1974	88	245	256	222	172	87	26	5.5
Guyana	F191	1961	150	329	292	229	153	44	6	6.0
	F192	1970	108	280	249	187	123	45	6	5.0
Paraguay	F226	1960	129	280	347	264	162	94	38	6.6
	F227	1972	126	240	300	250	170	64	30	5.9
Peru	F228	1961	124	309	298	281	189	87	24	6.6
	F229	1965	122	302	290	272	182	84	23	6.4
	F230	1970	108	296	321	259	202	84	23	6.5
	F230A	1976	87	237	279	242	194	71	6	5.6
Uruguay	F252	1963	68	167	162	105	59	26	4	3.0
	F253	1975	72	159	163	111	68	21	3	3.0
Venezuela	F259	1965	125	331	320	249	188	69	16	6.5
	F268	1974	109	250	237	197	142	59	13	5.0

[a] Codes refer to source information listed in Table A11 of supplement, available on request.
[b] Estimated
[c] Due to statistical methods used, 1978 data are not directly comparable with 1960-76 data shown.
[d] Vital registration considered incomplete or of unknown completeness

BIBLIOGRAPHY

1. ANONYMOUS. Age of marriage in Iran. International Planned Parenthood Federation Law File 5: 8. May 1979.

2. ANONYMOUS. Changes in Sri Lankan Marriage Law expected. IPPF Open File. January 26, 1979. 1 p.

3. ANONYMOUS. India raises age of marriage. International Planned Parenthood Federation Law File 9: 1. October 1978.

4. ANONYMOUS. Iranian women protest Islamic anti-feminist policies. Washington Post (Washington, D.C.), March 9, 1979. p. A1.

5. ANONYMOUS. Raising the age of marriage. Centre Calling 13(3-4): 2. March-April 1978.

6. ADADEVOH, B.K. Sub-fertility and infertility in Africa. Ibadan, Nigeria, Caxton Press. 1974. 114 p.

7. ADEGBOLA, O. New estimates of fertility and child mortality in Africa, south of the Sahara. Population Studies 31(3): 467-486. November 1977.

8. AFZAL, M. and HUSSAIN, M. The population of Pakistan. Rawalpindi, Pakistan, Fenozons. 1974. (CICRED Series: Pakistan) 112 p.

9. ARKUTU, A.A. Pregnancy and labor in Tanzanian primigravidae aged 15 years and under. International Journal of Gynaecology and Obstetrics 16(2): 128-131. September-October 1978.

10. ARNOLD, D.F., PHANANIRAMAI, M., RETHERFORD, R.D., and CHO, L.-J. Estimates of fertility in Thailand: an application of own-children analysis. Presented at 2nd Own-Children Workshop, East-West Population Institute. October 18-22, 1976.

11. ARRETX, C. Nuptiality in Latin America. In: International Union for the Scientific Study of Population [IUSSP]. International Population Conference, London 1969. Vol. 3. Liege, Belgium, IUSSP. 1971. p. 2127-2152.

12. BAHRAIN. MINISTRY OF FINANCE AND NATIONAL ECONOMY. Statistics of the Population Census, 1971. Manama, Bahrain, Statistical Bureau, 1972. p. 1, 15-18, 67-68, 125-130.

13. BANGLADESH EMBASSY. [Minimum legal age at marriage] Personal communication, August 20, 1979.

14. BANGLADESH. MINISTRY OF HEALTH AND POPULATION CONTROL. POPULATION CONTROL AND FAMILY PLANNING DIVISION. Bangladesh fertility survey, 1975-1976. First report. [Dacca], Bangladesh, December 1978. (World Fertility Survey) 621 p.

15. BERELSON, B. Family planning programs: an international survey. New York, Basic Books. 1969. 299 p.

16. BLACKER, J., SABA, B. and MOSER, K. Fertility trends in Kenya 1962-1978: an early re-assessment. Presented at the Tropical African Workshop, Kenya. 1979.

17. BLAKE, J. Family structure in Jamaica. New York, Free Press of Glencoe. 1961. 262 p.

18. BLAYO, Y. Les premiers mariages féminins en Asie. [First marriages of women in Asia.] [FR] Population 33(4-5): 951-985. July-October 1978.

19. BLUMBERG, R.L. Techno-economic base, fertility, and the status of women. Presented at the FAO Seminar on the Role of Women in Integrated Rural Development with Emphasis on Population Problems, Cairo, Egypt. November 1974. 18 p.

20. BOSERUP, E. Woman's role in economic development. New York, St. Martin's Press. 1970. 283 p.

21. BRACKETT, J.W. and RAVENHOLT, R.T. World fertility, 1976: an analysis of data sources and trends. Population Reports, Series J, No. 12. Washington, D.C., George Washington University Medical Center, Population Information Program. November 1976. 32 p.

22. BUMPASS, L. The changing linkage of nuptiality and fertility in the United States. Presented at the International Union for the Scientific Study of Population Seminar on Nuptiality and Fertility, Bruges, January 8-11, 1979. 18 p.

23. BUMPASS, L.L. and MBURUGU, E.K. Age at marriage and completed family size. Social Biology 24(1): 31-37. Spring 1977.

24. BUMPASS, L.L., RINDFUSS, R.R., and JANOSIK, R.B. Age and marital status at first birth and the pace of subsequent fertility. Demography 15(1): 75-86. February 1978.

25. BUSFIELD, J. Age at marriage and family size: social causation and social selection hypotheses. Journal of Biosocial Science 4(1): 117-134. 1972.

26. BUVINIC, M., YOUSSEF, N.H. and VON ELM, B. Women-headed households: the ignored factor in development planning. Washington, D.C., International Center for Research on Women. March 1978. 113 p.

27. CALDWELL, J.C. The economic rationality of high fertility: an investigation illustrated with Nigerian survey data. Population Studies 31(1): 5-27. March 1977.

28. CALDWELL, J.C. Population growth and family change in Africa. New York, Humanities Press. 1968. 222 p.

29. CALDWELL, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press. 1975. 763 p.

30. CALDWELL, J.C. and THOMPSON, B. Gambia. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press. 1975. p. 493-526.

31. CENTRAL AFRICAN REPUBLIC EMBASSY. [Minimum legal age at marriage] Personal communication, August 17, 1979.

32. CENTRAL AGENCY FOR PUBLIC MOBILISATION AND STATISTICS [CAPMAS]. Statement on the population of the Arab Republic of Egypt. Cairo, Arab Republic of Egypt, June 9, 1979. 18 p.

33. CENTRO PARAGUAYO DE ESTUDIOS SOCIOLOGICOS. La población de Paraguay. [The population of Paraguay] [SP] [Paris, France], CICRED, 1974. (CICRED Series: Paraguay) 197 p.

34. CHAO, J.C. [US Agency for International Development] [Total fertility rates for Taiwan] Personal communication. September 19, 1979.

35. CHEN MUHUA. Realization of the four modernizations hinged on planned control of population growth. People's Daily (People's Republic of China), August 11, 1979. 11 p.

36. CHEN, P.-C. Birth planning in China. International Family Planning Perspectives 5(3), 1979. (in press)

37. CHEN, P.-C. [Population policies in China] Personal communication, September 27, 1979.

38. CHEN, P.-C. Populations and vital rates and Planned Birth Program data for various political units of China. January 25, 1979. 17 p. (Unpublished)

39. CHINA, PEOPLE'S REPUBLIC OF. CENTRAL PEOPLE'S GOVERNMENT COUNCIL. The marriage law of the People's Republic of China. Peking, China, Foreign Language Press, 1975. 10 p.

40. CHINA, REPUBLIC OF. DIRECTORATE-GENERAL OF BUDGET, ACCOUNTING AND STATISTICS. Statistical yearbook of The Republic of China: 1976. Taipei, Republic of China, Directorate-General of Budget. [1976]. p. 18-19.

41. CHINA, REPUBLIC OF. DIRECTORATE-GENERAL OF BUDGET, ACCOUNTING AND STATISTICS. Statistical yearbook of The Republic of China: 1976. Taipei, Republic of China, Directorate-General of Budget, [1976]. p. 410-413.

42. CHINNATAMBY, S. [Family Planning Association of Sri Lanka] [Decline in fertility in Sri Lanka] Personal communication, April 11, 1979.

43. CHO, L.-J. and RETHERFORD, R.D. Comparative analysis of recent fertility trends in East Asia. In: International Union for the Scientific Study of Population [IUSSP]. International Population Conference, Liège, 1973. Vol. 2. Liège, Belgium, IUSSP, 1973. p. 163-181.

44. CHULALONGKORN UNIVERSITY. INSTITUTE OF POPULATION STUDIES and NATIONAL STATISTICAL OFFICE. NATIONAL ECONOMIC AND SOCIAL DEVELOPMENT BOARD. The population of Thailand: a monograph for the World Population Year, 1974. Bangkok, Thailand, CICRED, 1974. (CICRED Series: Thailand) 125 p.

45. CHULALONGKORN UNIVERSITY. INSTITUTE OF POPULATION STUDIES and NATIONAL STATISTICAL OFFICE. POPULATION SURVEY DIVISION. The survey of fertility in Thailand. Country report Vol. 1. Bangkok, Thailand, Chulalongkorn University and National Statistical Office, 1977. (World Fertility Survey) (Survey of Fertility in Thailand, Report 1) 188 p.

46. COALE, A.J. Age patterns of marriage. Population Studies 25(2): 193-214. July 1974.

47. COALE, A.J. The decline of fertility in Europe from the French Revolution to World War II. In: Behrman, S.J., Corsa, L., Jr., and Freedman, R. Fertility and family planning: a world view. Ann Arbor, Michigan, University of Michigan Press. 1969. p. 3-24.

48. COALE, A.J. Factors associated with the development of low fertility: an historic summary. In: Proceedings of the World Population Conference, Belgrade, August 30-September 10, 1965. Vol. 2. New York, United Nations, 1967. (E/CONF.41/3) p. 205-209.

49. COALE, A.J. T.R. Malthus and the population trends in his day and ours. Edinburgh, Scotland, University of Edinburgh. 1978. (Encyclopaedia Britannica Lecture) 13 p.

50. COLLVER, O.A. Women's work participation and fertility in metropolitan areas. Demography 5(1): 55-60. 1968.

51. COLOMBIA. ASOCIACION COLOMBIANA PARA EL ESTUDIO DE LA POBLACION. La población de Colombia. [The population of Colombia.] [SP] [Paris, France], CICRED. 1975. (CICRED Series: Colombia) 183 p.

52. COLOMBIA. CORPORATION CENTRO REGIONAL DE POBLACION. DEPARTAMENTO ADMINISTRATIVO NACIONAL DE ESTADISTICA [DANE]. Encuesta nacional de fecundidad, Colombia, 1976: resultados generales. [National fertility survey, Colombia, 1976: general findings.] [SP] Bogotá, Colombia, DANE. September 1976. (World Fertility Survey) 491 p.

53. CORNEJO, G., KELLER, A., LERNER, S., and AZUARA, L. Law and population in Mexico. Medford, Massachusetts, Tufts University, Fletcher School of Law and Diplomacy. 1975. (Law and Population Monograph Series No. 23) 78 p.

54. COURBAGE, Y. and FARGUES, P. La situation démographique au Liban. [The demographic situation of Lebanon.] [FR] Beirut, Lebanon, L'Université Libanaise, 1976. (CICRED Series: Lebanon) 132 p.

55. COUREL, A. and POOL, D.I. Upper Volta. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press. 1975. p. 701-719.

56. CUCA, R. and PIERCE, C.S. Experiments in family planning: lessons from the developing world. Baltimore, Maryland, Johns Hopkins University Press. 1977. 251 p.

57. DANKOUSSOU, I., DIARRA, S., LAYA, D., and POOL, D.I. Niger. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 679-693.

58. DAVIS, K. The theory of change and response in modern demographic history. Population Index 29: 345-366. 1963.

59. DAY, L.H. Differential fertility in Australia. In: International Union for the Scientific Study of Population [IUSSP]. International Population Conference, London 1969, Vol. 3. Liege, Belgium, IUSSP, 1971. p. 2043-2052.

60. DAY, L.H. Fertility and wife's age at marriage: a causal framework. 1979. 33 p. (Unpublished)

61. DEERE, C.D. The agricultural division of labor by sex: myths, facts and contradictions in the Northern Peruvian Sierra. Presented at the Joint National Meeting of the Latin American Studies Association and the African Studies Association, Houston, Texas, November 2-5, 1972. 29 p.

62. DEMENY, P. Patterns of population growth and structural change in the world economy: a North-South perspective for the 1980s. Presented at the Conference on Economic and Demographic Change: Issues for the 1980s, Helsinki, Finland, August 28-September 1, 1978. 17 p.

63. DEMING, M.B., VAN ARSDOL, M.D., Jr., and ZAYANI, A.A. The population of Bahrain: trends and prospects. September 1978. 192 p. (Unpublished)

64. DEPARTAMENTO ADMINISTRATIVO NACIONAL DE ESTADISTICA. DIVISION DE DEMOGRAFIA. La fecundidad en Colombia en 1978. Encuesta Nacional de Hogares, etapa 19. [The fertility of Colombia in 1978. National census of households, stage 19.] [SP] Boletin Mensual de Estadistica, No. 325. August 1978. p. 7-14.

65. DERRETT, J.D.M. The death of a marriage law: epitaph for the Rishis. Durham, North Carolina, Carolina Academic Press. 1978. 228 p.

66. DIB, G.M. Law and population in Lebanon. Medford, Massachusetts, Tufts University, Fletcher School of Law and Diplomacy, 1975. (Law and Population Monograph Series No. 29) 45 p.

67. DIXON, R.B. Explaining cross-cultural variations in age at marriage. Population Studies 125(2): 215-233. 1971.

68. DIXON, R.B. Late marriage and non-marriage as demographic responses: are they similar? Population Studies 32(3): 449-466. November 1978.

69. DIXON, R.B. Rural women at work: strategies for development in South Asia. Baltimore, Maryland, Johns Hopkins University Press, 1978. (Resources for the Future) 227 p.

70. DOMINICAN REPUBLIC. CONSEJO NACIONAL DE POBLACION Y FAMILIA. Encuesta nacional de fecundidad: informe general. [National survey of fecundity: general report.] [SP] Santo Domingo, Dominican Republic, Secretaria de Estado de Salud Publica y Asistencia Social, October 1976. (World Fertility Survey) 611 p.

71. DOW, T.E., Jr. and BENJAMIN, E. Demographic trends and implications. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 427-454.

72. DRIVER, E.D. Differential fertility in Central India. Princeton, New Jersey, Princeton University Press, 1963. 152 p.

73. DUZA, M.B. and BALDWIN, C.S. Nuptiality and population policy: an investigation in Tunisia, Sri Lanka, and Malaysia. New York, The Population Council. 1977. 83 p.

74. EL-ASAD, S. and KHALIFA, A.M. Fertility estimates and differentials in Jordan, 1972-1976. Population Bulletin of the United Nations Economic Commission for Western Asia, No. 12, January 1977. p. 20-26.

75. EL-KAMMASH, G.F. and EL-KAMMASH, M.M. Population and law: a study of the relations between population problems and law. Durham, North Carolina, Rule of Law Press, 1971. 452 p.

76. FAN, S.-C. The population of Hong Kong. Paris, France, CICRED, [1974]. (CICRED Series: Hong Kong) 50 p.

77. FARMAN-FARMAIAN, S. Early marriage and pregnancy in traditional Islamic society. Draper World Population Fund Report 1: 6-9. 1975.

78. FERNANDEZ, D.Z., HAWLEY, A.H., and PREDAZA, S. The population of Malaysia: a monograph for the World Population Year, 1974. [Paris, France], CICRED, December 1975. (CICRED Series: Malaysia) 106 p.

79. FERNANDO, D.F.S. Fertility trends in Sri Lanka and future prospects. Journal of Biosocial Science 8(1): 35-43. January 1976.

80. FERNANDO, D.F.S. Nuptiality, education, infant mortality and fertility in Sri Lanka. Journal of Biosocial Science 11(2): 133-140. April 1979.

81. FONG, P.E. Labour force growth, utilisation and determinants in Singapore. In: Standing, G. and Sheehan, G., eds. Labour force participation in low-income countries. Geneva, Switzerland, International Labour Office. 1978. p. 215-234.

82. FOX, R.W. and HUGUET, J.W. Population and urban trends in Central America and Panama. Washington, D.C., Inter-American Development Bank. 1977. 224 p.

83. GASLONDE, S. Studies on fertility and abortion in Asuncion, Bogota, Buenos Aires, Lima, and Panama City. In: Pan American Health Organization [PAHO]. Epidemilogy of abortion and practices of fertility regulation in Latin America: selected reports. Washington, D.C., PAHO, 1975. p. 9-25.

84. GERMAIN, A. and SMOCK, A. The status and roles of Ghanaian and Kenyan women: implications for fertility behavior. Presented at the Annual Meeting of the American Psychological Association, September 1, 1974. 41 p.

85. GIELE, J.Z. and SMOCK, A.C., eds. Women: roles and status in eight countries. New York, John Wiley and Sons, 1977. 443 p.

86. GOMEZ, B.M. and BERMUDEZ M., V.V. Costa Rica. Country Profiles, April 1974. 12 p.

87. GOODE, W.J. World revolution and family patterns. New York, Free Press, 1963. 432 p.

88. GUINEA EMBASSY. [Minimum legal age at marriage] Personal communication, August 15, 1979.

89. GULICK, J. and GULICK, M.E. The domestic social environment of women and girls in Isfahan, Iran. In: Beck, L. and Keddie, N. Women in the Muslim world. Cambridge, Massachusetts, Harvard University Press, 1978. p. 501-521.

90. GULICK, J. and GULICK, M.E. Family structure and adaptations in the Iranian city of Isfahan. In: Allman, J., ed. Women's status and fertility in the Muslim world. New York, Praeger. 1978. p. 167-199.

91. HAITI EMBASSY. [Minimum legal age at marriage] Personal communication, August 20, 1979.

92. HAJNAL, J. European marriage patterns in perspective. In: Glass, D.V. and Eversley, D.E.C., eds. Population in history: essays in historical demography. Chicago, Illinois, Aldine Publishing Company. 1965. p. 101-143.

93. HAREWOOD, J. The population of Trinidad and Tobago. [Paris, France], CICRED, 1975. (CICRED Series: Trinidad and Tobago) 237 p.

94. HARRINGTON, J.A. Education, female status, and fertility in Nigeria. Presented at the Population Association of America, Atlanta, Georgia, April 15, 1978. 49 p.

95. HAUPT, A. and KANE, T.T. The Population Reference Bureau's population handbook. Washington, D.C., Population Reference Bureau. 1978. 59 p.

96. HENIN, R.A. Nomadic fertility as compared with that of rain cultivators in the Sudan. In: International Union for the Scientific Study of Population [IUSSP]. International Population Conference, London 1969. Vol. 1. Liège, Belgium, IUSSP. 1971. p. 792-800.

97. **HENIN, R.A., EWBANK, D., and HOGAN, H.**, eds. The demography of Tanzania: an analysis of the 1973 national demographic survey of Tanzania, Vol. 6. Dar es Salaam, Tanzania, Bureau of Statistics, Ministry of Finance and Planning and the Demographic Unit, Bureau of Resource Assessment and Land Use Planning, 1973. p. 16-17.

98. **HILL, A.G.** The demography of the Kuwaiti population of Kuwait. Demography 12(3): 537-548. August 1975.

99. **HILL, A.G.** The demography of the population of Kuwait. Population Bulletin of the United Nations Economic Commission for Western Asia, No. 13, July 1977. p. 42-55.

100. **HIMES, N.E.** Medical history of contraception. New York, Shocken Books, 1970. 521 p.

101. **HONG, S.-B. and TIETZE, C.** Survey of abortion providers in Seoul, Korea. Studies in Family Planning 10(5): 161-163. May 1979.

102. **HONG, S.-B. and WATSON, W.B.** The increasing utilization of induced abortion in Korea. Seoul, Korea, Korea University Press, May 1976. 181 p.

103. **HULL, T.H. and HULL, V.J.** The relation of economic class and fertility: an analysis of some Indonesian data. Population Studies 31(1): 43-57. March 1977.

104. **HULL, T.H., HULL, V.J., and SINGARIMBUN, M.** Indonesia's family planning story: success and challenge. Population Bulletin 32(6): 3-49. November 1977.

105. **HUSTON, P.** Message from the village. New York, Epoch B Foundation, 1978. 142 p.

106. **INDIA. MINISTRY OF HOME AFFAIRS. OFFICE OF THE REGISTRAR GENERAL AND CENSUS COMMISSIONER.** The population of India: a monograph for the UN World Population Year, 1974. [Paris, France], CICRED, September 1974. (CICRED Series: India) 152 p.

107. **INDONESIA. CENTRAL BUREAU OF STATISTICS.** Indonesia fertility survey. Principal report, Vol. 1. Jakarta, Indonesia, Central Bureau of Statistics, 1978. (World Fertility Survey) 158 p.

108. **INDONESIA. CENTRAL BUREAU OF STATISTICS.** Indonesia fertility survey. Principal report, Vol. 2. Jakarta, Indonesia, Central Bureau of Statistics, 1978. (World Fertility Survey) 278 p.

109. **INTERNATIONAL ADVISORY COMMITTEE ON POPULATION AND LAW.** Annual review of population law, 1974: constitutions, legislation, regulations, legal opinions and judicial decisions. Medford, Massachusetts, Tufts University, Fletcher School of Law and Diplomacy, 1975. (Law and Population Monograph Series No. 30) 113 p.

110. **INTERNATIONAL ADVISORY COMMITTEE ON POPULATION AND LAW.** Annual review of population law, 1975: constitutions, legislation, regulations, legal opinions and judicial decisions. Medford, Massachusetts, Tufts University, Fletcher School of Law and Diplomacy, 1976. (Law and Population Monograph Series No. 39) 146 p.

111. **INTERNATIONAL COMMITTEE FOR COORDINATION OF NATIONAL RESEARCH IN DEMOGRAPHY [CICRED].** La población de Costa Rica. [The population of Costa Rica.] [SP] San José, Costa Rica, Universidad de Costa Rica, Instituto de Investigaciones Sociales, 1976. (CICRED Series: Costa Rica) 199 p.

112. **INTERNATIONAL COMMITTEE FOR COORDINATION OF NATIONAL RESEARCH IN DEMOGRAPHY [CICRED].** La población de Cuba. [The population of Cuba.] [SP] Havana, Cuba, Instituto Cubano del Libro, 1976. (CICRED Series: Cuba) 236 p.

113. **INTERNATIONAL COMMITTEE FOR COORDINATION OF NATIONAL RESEARCH IN DEMOGRAPHY [CICRED].** La población de Venezuela. [The population of Venezuela.] [Paris, France], CICRED, [1974]. (CICRED Series: Venezuela) 167 p.

114. **INTERNATIONAL COMMITTEE FOR COORDINATION OF NATIONAL RESEARCH IN DEMOGRAPHY [CICRED].** La population de l'Algérie. [The population of Algeria.] [FR] [Paris, France], CICRED, 1974. (CICRED Series: Algeria) 174 p.

115. **INTERNATIONAL COMMITTEE FOR COORDINATION OF NATIONAL RESEARCH IN DEMOGRAPHY [CICRED].** The population of the Arab Republic of Egypt. Cairo, Egypt, CICRED, 1973. (CICRED Series: Egypt) 127 p.

116. **INTERNATIONAL COMMITTEE FOR COORDINATION OF NATIONAL RESEARCH IN DEMOGRAPHY [CICRED].** La population du Brésil. [The population of Brazil.] [FR] [Paris, France], CICRED, 1975. (CICRED Series: Brazil) 213 p.

117. **INTERNATIONAL COMMITTEE FOR COORDINATION OF NATIONAL RESEARCH IN DEMOGRAPHY [CICRED].** The population of Indonesia. Paris, France, CICRED, [1974]. (CICRED Series: Indonesia) 102 p.

118. **INTERNATIONAL COMMITTEE FOR COORDINATION OF NATIONAL RESEARCH IN DEMOGRAPHY [CICRED].** La population de l'Iran. [The population of Iran.] [FR] Paris, France, CICRED, 1974. (CICRED Series: Iran) 74 p.

119. **INTERNATIONAL COMMITTEE FOR COORDINATION OF NATIONAL RESEARCH IN DEMOGRAPHY [CICRED].** La population du Maroc. [The population of Morocco.] [FR] Rabat, Morocco, Institut national de statistique et d'économie appliquée, [1975]. (CICRED Series: Morocco) 104 p.

120. **INTERNATIONAL LABOUR OFFICE [ILO].** Year book of labour statistics. 36th ed. [EN, FR, SP] Geneva, Switzerland, ILO, 1976. 965 p.

121. **INTERNATIONAL LABOUR OFFICE [ILO].** Year book of labour statistics. 37th ed. [EN, FR, SP] Geneva, Switzerland, ILO, 1977. 909 p.

122. **INTERNATIONAL LABOUR OFFICE [ILO].** Year book of labour statistics. 38th ed. [EN, FR, SP] Geneva, Switzerland, ILO, 1978. 678 p.

123. **INTERNATIONAL PLANNED PARENTHOOD FEDERATION. INDIAN OCEAN REGION [IPPF/IOR].** Facts and figures on population and family planning programmes. Colombo, Sri Lanka, IPPF/IOR, 1975. 56 p.

124. **IRAN. STATISTICAL CENTRE. PLAN AND BUDGET ORGANIZATION.** National Census of Population and Housing: total country based on a 5% sample. [FA] Iran, Statistical Center, Plan and Budget Organization, November 1976. p. 19-36, 52-60.

125. **JALALI, G.H. and PEYMAN, H.** Study and statistical analysis of abortion in Farah Maternity Hospital, Teheran. Presented at the Near and Middle East Medical Conference, Istanbul, September 10-14, 1972. 12 p.

126. **JAYASURIYA, D.C.** Law and population growth in Sri Lanka. Medford, Massachusetts, Tufts University, Fletcher School of Law and Diplomacy, 1976. (Law and Population Monograph Series No. 40) 42 p.

127. **JELIN, E.** Migration and labor force participation of Latin American women: the domestic servants in the cities. In: Wellesley Editorial Committee. Women and national development: the complexities of change. Chicago, Illinois, University of Chicago Press, 1977. p. 129-141.

128. **JOSEPH, W.** Liberia. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 527-542.

129. **KANDIS, A.D.** Female education and fertility decline in a developing country: the case of Jordan. Population Bulletin of the United Nations Economic Commission for Western Asia, No. 13, July 1977. p. 42-55.

130. **KARIM, M.S.** Socioeconomic and cultural aspects of age at marriage and fertility in Pakistan. Honolulu, Hawaii, East-West Population Institute, [1979]. 27 p. (In press)

131. **KATTI, A.P.** India (Country news). Asian-Pacific Population Programme News 8(2): 22-24. 1979.

132. **KATZ, J.S. and KATZ, R.S.** Legislating social change in a developing country: the new Indonesian marriage law revisited. American Journal of Comparative Law 26(2): 309-320. 1978.

133. **KATZ, J.S. and KATZ, R.S.** The new Indonesian marriage law: a mirror of Indonesia's political, cultural and legal systems. American Journal of Comparative Law 23(4): 653-680. 1975.

134. **KENDALL, M.** The World Fertility Survey: current status and findings. Population Reports, Series M, No. 3. Baltimore, Maryland, Johns Hopkins University, Population Information Program, July 1979. 32 p.

135. **KENNEDY, R.E., Jr.** The Irish: emigration, marriage, and fertility. Berkeley, California, University of California Press, 1973. 236 p.

136. **KIAPI, A.** Law and population in Uganda. Medford, Massachusetts, Tufts University, Fletcher School of Law and Diplomacy, 1977. (Law and Population Monograph Series No. 42) 53 p.

137. **KIRK, M., LIVI BACCI, M. and SZABADY, E.**, eds. Law and fertility in Europe: a study of legislation directly or indirectly affecting fertility in Europe, Vol. 1. Dolhain, Belgium, Ordina Editions, 1975. 337 p.

138. **KIRK, M., LIVI BACCI, M., and SZABADY, E.**, eds. Law and fertility in Europe: a study of legislation directly or indirectly affecting fertility in Europe, Vol. 2. Dolhain, Belgium, Ordina Editions, 1975. 698 p.

139. **KOREA. ECONOMIC PLANNING BOARD. NATIONAL BUREAU OF STATISTICS and THE KOREAN INSTITUTE FOR FAMILY PLANNING.** The Korean national fertility survey. First country report, 1974. Seoul, Korea, National Bureau of Statistics, December 1977. (World Fertility Survey) 863 p.

140. **KRISHNAN, P.** A note on changes in age at marriage of females and their effect on the birth rate in India. Social Biology 18(2): 200-202. July 1971.

141. **KROTKI, K.J. and BEAUJOT, R.** La population marocaine: reconstitution de l'évolution de 1950 à 1971. [The Moroccan population: reconstruction of the trends from 1950 to 1971.] [FR] Population 30(2): 335-367. March-April 1975.

142. **KUWAIT. EMBASSY.** [Minimum legal age at marriage] Personal communication, August 20, 1979.

143. **KUWAIT. PLANNING BOARD.** Kuwait. Population Census, 1970. Kuwait, Central Statistical Office, October 1972. 7 p.

144. **KWON, T.H., LEE, H.Y., CHANG, Y., and YU, E.-Y.** The population of Korea. Seoul, Korea, Seoul National University, Population and Development Studies Center, 1975. (CICRED Series: Korea) 154 p.

145. **LACOMBE, B., LAMY, B., and VAUGELADE, J.** Senegal. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 701-719.

146. **LAPHAM, R.J.** Family planning and fertility in Tunisia. Demography 7(2): 241-253. May 1970.

147. **LaPIERRE-ADAMCYK, E. and BURCH, T.K.** Trends and differentials in age at marriage in Korea. Studies in Family Planning 5(8): 255-260. August 1974.

148. **LASLETT, P. and WALL, R.**, eds. Household and family in past time. Cambridge, UK, Cambridge University Press, 1972.

149. **LEE, L.T. and LARSON, A.**, eds. Population and law: a study of the relations between population problems and law. Durham, North Carolina, Rule of Law Press, 1971. 452 p.

150. **LESTHAEGHE, R.** The feasibility of controlling population growth through nuptiality and nuptiality policies. In: International Union for the Scientific Study of Population [IUSSP]. International Population Conference, Liège 1973. Vol. 3. Liège, Belgium, IUSSP, 1973. p. 319-341.

151. **LIBYA. EMBASSY.** [Minimum legal age at marriage] Personal communication, August 20, 1979.

152. **LIBYA. MINISTRY OF ECONOMY AND TRADE.** General population census 1964. Tripoli, Libya, Census and Statistics Department, 1964. 4 p.

153. **LITTLE, K.** African women in towns: an aspect of Africa's social revolution. Cambridge, England, University Press, 1973. 242 p.

154. **LORIMER, F.** Culture and human fertility: a study of the relation of cultural conditions to fertility in non-industrial and transitional societies. New York, Greenwood Press, 1958. 510 p.

155. **MAJUMDAR, M. and GUPTA, A.D.** Marriage trends and their demographic implications. Sankhyā: Indian Journal of Statistics, Series B, 31(3-4): 491-500. December 1969.

156. **MALAKER, C.R.** Female age at marriage and the birth rate in India. Social Biology 19(3): 297-301. September 1972.

157. **MALAYSIA. DEPARTMENT OF STATISTICS.** Malaysian fertility and family survey — 1974. First country report. Kuala Lumpur, Malaysia, April 1977. (World Fertility Survey) 501 p.

158. **MALTHUS, T.R.** An essay on population, Vol. 1. New York, E.P. Dutton, 1960. 315 p.

159. **MALTHUS, T.R.** An essay on the principle of population, as it affects the future improvement of society, with remarks on the speculations of Mr. Godwin, M. Condorcet, and other writers. London, Macmillan, 1926. 396 p.

160. **MARIANO, W.E.** Marriage information. In: Delury, G.E., ed. The world almanac and book of facts 1979. New York, Newspaper Enterprise Association, 1979, p. 963.

161. **MASNICK, G.S. and McFALLS, J.A., Jr.** Those perplexing U.S. fertility swings: a new perspective on a 20th century puzzle. PRB Report, November 1978. 11 p.

162. **MASSALEE, A.Z.** The population of Liberia. [Paris, France], CICRED, 1974. (CICRED Series: Liberia) 56 p.

163. **MATHEWS, J.** China strengthens measures to cut back high birth rate. Washington Post (Washington, D.C.), May 1, 1979. 2 p.

164. **MATHEWS, J.** China winds down from political high. Washington Post (Washington, D.C.), January 5, 1979. p. A12.

165. **MATRAS, J.** The social strategy of family formation: some variations in time and space. Demography 2: 349-362. 1965.

166. **MAULDIN, W.P. and BERELSON, B.**, with a section by **SYKES, Z.** Conditions of fertility decline in developing countries, 1965-1975. Studies in Family Planning 9(5): 89-145. May 1978.

167. **McGREEVEY, W.P. and BIRDSALL, N.** The policy relevance of recent social research on fertility. Washington, D.C., Smithsonian Institution, Interdisciplinary Communications Program, September 1974. (Occasional Monograph Series No. 2) (AID/csd-3598) 109 p.

168. **MEDICA, V.N.** La población de Panama. [The population of Panama.] [SP] [Panama City, Panama], Dirección de Estadística y Censo, 1974. (CICRED Series: Panama) 147 p.

169. **MEXICO. COORDINACION GENERAL DES SISTEMA NACIONAL DE INFORMACION. DIRECCION GENERAL DE ESTADISTICA. SECRETARIA DE PROGRAMACION Y PRESUPUESTO.** Encuesta mexicana de fertilidad. Primer informe nacional. Vol. 2. [Mexican fertility survey. First country report. Vol. 2] [SP] Mexico City, February 1979. (World Fertility Survey)

170. **MOMENI, D.A.** The difficulties of changing the age at marriage in Iran. Journal of Marriage and the Family 34(3): 545-551. August 1972.

171. **MONTEVERDE, R.** [Population Council] [Data on age at marriage, crude birthrates, and selected measures of social setting] Personal communication, September 7, 1979. 22 p.

172. **MOORE, R., ASAYESH, K., and MONTAGUE, J.** Population and family planning in Iran. Middle East Journal 28(4): 396-408. 1974.

173. **MORGAN, R.W. and OHADIKE, P.O.** Fertility levels and fertility change. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 187-235.

174. **MORTARA, G.** Characteristics of the demographic structure of the American countries. Washington, D.C., Pan American Union, 1964. 198 p.

175. **MOTT, F.L. and FAPOHUNDA, O.J.** The population of Nigeria. Lagos, Nigeria, University of Lagos, April 1975. (Human Resources Research Unit No. 3) 100 p.

176. **MULLICK, V.D.** Family planning performance in some Muslim countries. In: Mullick, V.D. A few selected papers on population and family planning, 1974. New Delhi, India, National Institute of Family Planning, 1974. (NIFP Monograph Series No. 22) p. 51-78.

177. **MYRDAL, J.** Report from a Chinese village. New York, Pantheon, 1965. 373 p.

178. **NASH, J. and SAFA, H.I.**, eds. Sex and class in Latin America. New York, Praeger, 1976. 330 p.

179. **NEPAL. MINISTRY OF HEALTH. FAMILY PLANNING AND MATERNAL CHILD HEALTH PROJECT.** Nepal fertility survey, 1976. First report. Kathmandu, Nepal, His Majesty's Government, August 1977. (World Fertility Survey) 347 p.

180. **NEVILLE, W.** The birth rate in Singapore. Population Studies 32(1): 113-133. March 1978.

181. **NICARAGUA. BANCO CENTRAL DE NICARAGUA. MINISTERIO DE ECONOMIA.** Industria y comercio. Censos nacionales 1971, 20 Abril de 1971, población, Vol. 1. Características generales. [Industry and commerce. National census 1971, April 20, 1971, population, Vol. 1. General characteristics.] [SP] Managua, Nicaragua, Ministerio de Economia, October 1974. p. 209-259.

182. **NIGER. EMBASSY.** [Minimum legal age at marriage] Personal communication, August 15, 1979.

183. **NORTMAN, D.** Parental age as a factor in pregnancy outcome and child development. Reports on Population/Family Planning 16, August 1974. 51 p.

184. **OHADIKE, P.** The possibility of fertility change in modern Africa: a West African case. In: International Union for the Scientific Study of Population [IUSSP]. International Population Conference, London 1969. Vol. 1. Liège, Belgium, IUSSP, 1971. p. 801-810.

185. **OHADIKE, P.O.** Some demographic notes on marriage and the family in Lagos, Nigeria. In: Caldwell, J.C. and Okonjo, C., eds. The population of tropical Africa. London, Longmans, 1968. p. 379-392.

186. **OHADIKE, P.O. and TESFAGHIORGHIS, H.** The population of Zambia. [Paris, France], CICRED, 1975. (CICRED Series: Zambia) 181 p.

187. **OKEDIJI, F.O.** Population dynamics research in Nigeria: achievements and new horizons. In: Okediji, F.O., ed. Population dynamics research in Africa. Proceedings of Workshop/Seminar 4, Lome, Togo, July 30-August 3, 1973. Washington, D.C., Smithsonian Institution, Interdisciplinary Communications Program, December 1974. p. 3-18.

188. **OLUSANYA, P.O.** Modernisation and the level of fertility in Western Nigeria. In: International Union for the Scientific Study of Population [IUSSP]. International Population Conference, London 1969. Vol. 1. Liège, Belgium, IUSSP, 1971. p. 812-825.

189. **OLUSANYA, P.O.** Population growth and its components: the nature and direction of population change. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 254-274.

190. **OLUSANYA, P.O.** The problem of multiple causation in population analysis, with particular reference to the Polygamy-Fertility Hypothesis. Sociological Review 19(2): 165-178. May 1971.

191. **OWUSU, D.J.** Percent distribution of the population aged 15 years and over by age and marital status, 1960. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 362.

192. **PAGE, H.** Fertility levels: patterns and trends. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 29-57.

193. **PAKISTAN. POPULATION PLANNING COUNCIL.** Pakistan fertility survey. First report. Islamabad, Pakistan, Population Planning Council of Pakistan, October 1976. (World Fertility Survey) 320 p.

194. **PAKIZEGI, B.** Legal and social positions of Iranian women. In: Beck, L. and Keddie, N. Women in the Muslim world. Cambridge, Massachusetts, Harvard University Press, 1978. p. 216-226.

195. PANAMA. OFICINA DE ESTUDIOS DE POBLACION. Encuesta de fecundidad. Informe general, Panama, 1977. [Fertility survey. General report, Panama, 1977] [SP] Panama, November 1977. (World Fertility Survey) 485 p.

196. PEEL, J. The manufacture and retailing of contraceptives in England. Population Studies 17: 113-125. 1963.

197. PEIPMEIR, K. and HELLYER, E. Maximum age at marriage: 20 years of legal reform. London, International Planned Parenthood Federation, 1977. 1 p.

198. PETERSEN, W. Population. 2nd ed. London, Macmillan, 1969. 735 p.

199. PODLEWSKI, A. Cameroon. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 543-564.

200. POOL, D.I. Conjugal patterns in Ghana. Canadian Review of Sociology and Anthropology 5(4): 241-253. June 1969.

201. POPULATION REFERENCE BUREAU [PRB]. World population growth and response. Washington, D.C., PRB, April 1976. (AID/pha-C-1096) 271 p.

202. PROTHRO, E.T. and DIAB, L.N. Changing family patterns in the Arab East. Beirut, Lebanon, Heidelberg Press, 1974. 240 p.

203. RAVENHOLT, R.T. and CHAO, J.C. 1978 midyear population, 1965 and 1977 crude birth rates, percentage decline and data sources for world, regions and countries or territories. (Preliminary report) Washington, D.C., United States Agency for International Development, Office of Population, March 2, 1979. 6 p.

204. REYNA, S.P. and BOUQUET, C. Chad. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 565-581.

205. ROBERTS, G.W., POWELL, D., SINCLAIR, S., BOLAND, B., and HEWITT, L. Recent population movements in Jamaica. [Paris, France], CICRED, [1974]. (CICRED Series: Jamaica) 189 p.

206. ROBERTS, G.W. and SINCLAIR, S.A. Women in Jamaica: patterns of reproduction and family. Millwood, New York, KTO Press, 1978. 346 p.

207. RODRIGUES, W., DE PROENCA, J.A.G., PAIVA, M.A., DE QUEIROZ MATTOSO, F., DE AFFONSECA, L., DE PAIVA, O.A., NOQUEIRA, T., and FILHO, B.M. Law and population in Brazil. Medford, Massachusetts, Tufts University, Fletcher School of Law and Diplomacy, 1975. (Law and Population Monograph Series No. 34) 46 p.

208. RODRIGUEZ, G. [World Fertility Survey, London] [Most recent data for Mexico and Peru] Personal communication, October 2, 1979.

209. ROLDAN, H.G. La población de Chile. [The population of Chile] [SP] [Paris, France], CICRED, 1975. (CICRED Series: Chile) 81 p.

210. ROMANIUK, A. Infertility in tropical Africa. In: Caldwell, J.C. and Okonjo, C., eds. The population of tropical Africa. London, Longmans, 1968. p. 214-224.

211. ROOF, M. The decline of the birth rate in Iran. Presented at the Population Association of America, Philadelphia, Pennsylvania, April 26-28, 1979. 26 p.

212. ROSERO BIXBY, L. El programa nacional de planificacion familiar. [The national family planning program] [SP] In: Asociación Demográfica Costarricense, Direccion General de Estadistica y Čensos, and Westinghouse Health Systems. Informe de la encuesta nacional de uso de anticonceptivos, Costa Rica-1978. [Report of the national survey of contraceptive use, Costa Rica-1978] San José, Costa Rica, Direccion General de Estadistica y Censos, November 1978. p. 65-81.

213. SALAFF, J.W. The emerging conjugal relationship in the People's Republic of China. Journal of Marriage and the Family 35(4): 705-717. November 1973.

214. SALAFF, J.W. The status of unmarried Hong Kong women and the social factors contributing to their delayed marriage. Population Studies 30(3): 391-412. November 1976.

215. SAUDI ARABIA. EMBASSY. [Minimum legal age at marriage] Personal communication, August 20, 1979.

216. SCRIMSHAW, S.C.M. Stages in women's lives and reproductive decision-making in Latin America. Medical Anthropology 2(3): 41-58. 1978.

217. SEKLANI, M. La population de la Tunisie. [The population of Tunisia] [FR] [Paris, France], CICRED, 1974. (CICRED Series: Tunisia) 184 p.

218. SHEEHAN, G. and STANDING, G. A note on economic activity of women in Nigeria. Pakistan Development Review 17(2): 253-261. Summer 1978.

219. SHORTER, E., KNODEL, J., and VAN DE WALLE, E. The decline of non-marital fertility in Europe, 1880-1940. Population Studies 25(3): 375-393. 1971.

220. SIDEL, R. Women and child care in China, a firsthand report. Baltimore, Maryland, Penguin, 1973. 207 p.

221. SINQUEFIELD, J.C. and SUNGKONO, B. Fertility and family planning trends in Java and Bali. International Family Planning Perspectives 5(2): 43-58. June 1979.

222. SMITH, P.C. Asian nuptiality in transition. Presented at the 7th Summer Seminar in Population, East-West Population Institute, Honolulu, June 1976. 67 p.

223. SMITH, P.C. Indexes of nuptiality: Asia and the Pacific. Asian and Pacific Census Forum 5(2): 1-3, 6. November 1978.

224. SMITH, P.C. and KARIM, M. Urbanization, education, and nuptiality transition in four Asian societies. Presented at the Conference on Comparative Fertility Transition in Asia, Tokyo, Japan, March 27-31, 1978. 55 p.

225. SMOCK, A.C. Ghana: from autonomy to subordination. In: Giele, J.Z. and Smock, A.C. Women: roles and status in eight countries. New York, John Wiley and Sons, 1977. p. 173-216.

226. SOEWONDO, N. Marriage law reform in Indonesia. Draper World Population Fund Report 1: 18-19. 1975.

227. SRIKANTAN, K.S. The family planning program in the socioeconomic context. New York, The Population Council, 1977. 240 p.

228. SRI LANKA. DEPARTMENT OF CENSUS AND STATISTICS. The population of Sri Lanka. [Paris, France], CICRED, 1974. (CICRED Series: Sri Lanka) 128 p.

229. SRI LANKA. MINISTRY OF PLAN IMPLEMENTATION. DEPARTMENT OF CENSUS AND STATISTICS. World fertility survey, Sri Lanka, 1975. First report. Colombo, Sri Lanka, Department of Census and Statistics, March 1978. (World Fertility Survey) 713 p.

230. STANDING, G. Labour force participation and development. Geneva, Switzerland, International Labour Office, 1978. 267 p.

231. STANDING, G. and SHEEHAN, G., eds. Labour force participation in low-income countries. Geneva, Switzerland, International Labour Office, 1978. 331 p.

232. STYCOS, J.M. Recent trends in Latin American fertility. Population Studies 32(3): 407-424. November 1978.

233. SUDAN. EMBASSY. [Minimum legal age at marriage] Personal communication, August 20, 1979.

234. SUDAN. MINISTRY OF NATIONAL PLANNING. DEPARTMENT OF STATISTICS. POPULATION CENSUS OFFICE. Second population census 1973, Vol. 1. Socio-economic characteristics. Khartoum, Sudan, Ministry of National Planning, Department of Statistics, June 1977. 56 p.

235. SUHARTO, S. and CHO, L.J. Preliminary estimates of Indonesian fertility based on the 1976 intercensal population survey. Honolulu, Hawaii, East-West Center, May 1978. (Papers of the East-West Population Institute No. 52) 21 p.

236. SULBRANDT, J. and FERRERA, M.A. Law and population growth in Chile. Medford, Massachusetts, Tufts University, Fletcher School of Law and Diplomacy, 1975. (Law and Population Monograph Series No. 31) 45 p.

237. SUN, T-H., LIN, H-S., and FREEDMAN, R. Trends in fertility, family size preferences, and family planning practice: Taiwan, 1961-76. Studies in Family Planning 9(4): 54-70. April 1978.

238. SYRIAN ARAB REPUBLIC. MINISTRY OF PLANNING. DIRECTORATE OF STATISTICS. Syrian Arab Republic, Census of Population, 1960. Vol. 15. [EN, AR] Damascus, Syria, Syrian Arab Republic, Ministry of Planning, Directorate of Statistics, 1964. 287 p.

239. SYRIAN ARAB REPUBLIC. OFFICE OF THE PRIME MINISTER. CENTRAL BUREAU OF STATISTICS. Population census in Syrian Arab Republic 1970. Vol. 1. Syria, Syrian Arab Republic, Office of the Prime Minister, Central Bureau of Statistics, 1970. p. 206, 209, 213-214, 218-220.

240. TABUTIN, D. Nuptialité-fecondité au Maghreb. [Nuptiality-fecundity in Maghreb.] Presented at the International Union for the Scientific Study of Population Seminar on Nuptiality and Fecundity, Bruges, January 8-11, 1979. 33 p.

241. TAEUBER, I.B. The population of Japan. Princeton, New Jersey, Princeton University Press, 1958. 461 p.

242. TEACHMAN, J.D., HOGAN, D.P., and BOGUE, D.J. A components method for measuring the impact of a family planning program on birth rates. Demography 15(1): 113-129. February 1978.

243. TESSLER, M.A., ROGERS, J.M., and SCHNEIDER, D.R. Tunisian attitudes toward women and child rearing. In: Allman, J., ed. Women's status and fertility in the Muslim world. New York, Praeger, 1978. p. 289-311.

244. THAILAND. NATIONAL STATISTICAL OFFICE [NSO]. The survey of population change: 1974-75. Bangkok, Thailand, NSO, 1976.

245. THEIN, T.M. and REYNOLDS, J. Contraception in Costa Rica: the role of the private sector 1959-1969. February 1972. 71 p. (Mimeo)

246. TIEN, H.Y. China's experience in population control: the elusive model. Sociological Focus 8(2): 191-196. April 1975.

247. TIEN, H.Y. China's population struggle. Columbus, Ohio, Ohio State University Press, 1973. 405 p.

248. TIEN, H.Y. Fertility decline via marital postponement in China. Modern China 1(4): 447-462. October 1975.

249. TIMUR, S. Demographic correlations of woman's education: fertility, age at marriage and the family. In: International Union for the Scientific Study of Population [IUSSP]. International Population Conference, Mexico 1977. Vol. 3. Liège, Belgium, IUSSP, 1977. p. 463-495.

250. TREVOR, J. Family change in Sokoto: a traditional Moslem Fulani/Hausa city. In: J.C. Caldwell, ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 236-253.

251. TRUSSELL, J. and BROWN, E. A close look at the demography of Afghanistan. Demography 16(1): 137-156. February 1977.

252. UNITED NATIONS [UN]. Manual III: methods of population projections by sex and age. New York, UN, 1956. p. 42-44.

253. UNITED NATIONS [UN]. World population plan of action: adopted by the World Population Conference Bucharest, 1974. Washington, D.C., U.S. Agency for International Development, August 1976. 44 p.

254. UNITED NATIONS [UN]. DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS. Status of women and family planning: report of the Special Rapporteur appointed by the Economic and Social Council under Resolution 1326 (XLIV). New York, UN, 1975. (E/CN.6/575/Rev. 1) 148 p.

255. UNITED NATIONS [UN]. DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS. STATISTICAL OFFICE. Demographic yearbook 1968. Special topic: marriage and divorce statistics. 20th ed. [EN, FR] New York, UN, 1969. 818 p.

256. UNITED NATIONS [UN]. DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS. STATISTICAL OFFICE. Demographic yearbook 1976. Special topic: marriage and divorce statistics. 28th ed. [EN, FR] New York, UN, 1977. (ST/ESA/STAT/SER.R/4) 984 p.

257. UNITED NATIONS [UN]. DEPARTMENT OF INTERNATIONAL ECONOMIC AND SOCIAL AFFAIRS. STATISTICAL OFFICE. Demographic yearbook 1977. Special topic: international migration statistics. 29th ed. [EN, FR] New York, UN, 1978. (ST/ESA/STAT/SER.R/6) 1024 p.

258. UNITED NATIONS [UN]. ECONOMIC COMMISSION FOR AFRICA [ECA]. Demographic handbook for Africa. [EN, FR] Addis Ababa, Ethiopia, UNECA, April 1975. 126 p.

259. UNITED NATIONS [UN]. ECONOMIC COMMISSION FOR WESTERN ASIA [ECWA]. Demographic and related socio-economic data sheets for countries of the Economic Commission for Western Asia. Beirut, Lebanon, ECWA, January 1978. (No. 2) 20 p.

260. UNITED NATIONS [UN]. ECONOMIC COMMISSION FOR WESTERN ASIA [ECWA]. POPULATION DIVISION. An overview of the population situation in Bahrain. Population Bulletin of the United Nations Economic Commission for Western Asia, No. 14, June 1978. p. 57-69.

261. UNITED NATIONS [UN]. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC [ESCAP]. The demographic situation in Hong Kong. Bangkok, Thailand, UN, 1974. (ESCAP Country Monograph Series No. 1; E/CN.11/1120) 165 p.

262. UNITED NATIONS [UN]. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC [ESCAP]. Population of the Philippines. Bangkok, Thailand, UN, 1978. (ESCAP Country Monograph Series No. 5; ST/ESCAP/63) 349 p.

263. UNITED NATIONS [UN]. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC [ESCAP]. Population of the Republic of Korea. Bangkok, Thailand, UN, 1975. (ESCAP Country Monograph Series No. 2; E/CN.11/1241) 273 p.

264. UNITED NATIONS [UN]. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC [ESCAP]. Population of Sri Lanka. Bangkok, Thailand, UN, 1976. (ESCAP Country Monograph Series No. 4; ST/ESCAP/30) 397 p.

265. UNITED NATIONS [UN]. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC [ESCAP]. Population of Thailand. Bangkok, Thailand, UN, 1976. (ESCAP Country Monograph Series No. 3; ST/ESCAP/18) 220 p.

266. UNITED NATIONS [UN]. ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC [ESCAP]. Report of the Expert Group Meeting on Socio-economic Measures Affecting Fertility Behaviour with Special Emphasis on Actionable Programmes, Bangkok, Thailand, September 5-10, 1977. Bangkok, Thailand, UN, 1978. (Asian Population Studies Series No. 41; ST/ESCAP/31) 33 p.

267. UNITED NATIONS EDUCATIONAL, SCIENTIFIC, AND CULTURAL ORGANIZATION [UNESCO]. Statistical yearbook 1976. Paris, France, UNESCO, 1977. 1074 p.

268. UNITED NATIONS FUND FOR POPULATION ACTIVITIES [UNFPA]. OFFICE OF EVALUATION. Evaluation of the Costa Rica National Family Planning and Sex Education Programme. New York, UN, December 6, 1978. (Background paper) 131 p.

269. UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT [USAID]. OFFICE OF POPULATION. World fertility patterns. Age-specific fertility rates for countries of the world. Washington, D.C., USAID, October 1977. 10 p. (Unpublished)

270. UNITED STATES. DEPARTMENT OF COMMERCE. BUREAU OF THE CENSUS. Brazil. (Country Demographic Profiles) (To be published by U.S. Government Printing Office)

271. UNITED STATES. DEPARTMENT OF COMMERCE. BUREAU OF THE CENSUS. A compilation of age-specific fertility rates for developing countries. Washington, D.C., U.S. Government Printing Office, 1979. (In press)

272. UNITED STATES. DEPARTMENT OF COMMERCE. BUREAU OF THE CENSUS. Ghana. Washington, D.C., U.S. Government Printing Office, September 1977. (Country Demographic Profiles ISP-DP-5) 21 p.

273. UNITED STATES. DEPARTMENT OF COMMERCE. BUREAU OF THE CENSUS. Guatemala. Washington, D.C., U.S. Government Printing Office, October 1977. (Country Demographic Profiles ISP-DP-6) 23 p.

274. UNITED STATES. DEPARTMENT OF COMMERCE. BUREAU OF THE CENSUS. Honduras. Washington, D.C., U.S. Government Printing Office, December 1977. (Country Demographic Profiles ISP-DP-10) 21 p.

275. UNITED STATES. DEPARTMENT OF COMMERCE. BUREAU OF THE CENSUS. Jamaica. Washington, D.C., U.S. Government Printing Office, November 1977. (Country Demographic Profiles ISP-DP-9) 21 p.

276. UNITED STATES. DEPARTMENT OF COMMERCE. BUREAU OF THE CENSUS. Kenya. Washington, D.C., U.S. Government Printing Office, January 1978. (Country Demographic Profiles ISP-DP-11) 17 p.

277. UNITED STATES. DEPARTMENT OF COMMERCE. BUREAU OF THE CENSUS. Republic of China. Washington, D.C., U.S. Government Printing Office, February 1978. (Country Demographic Profiles ISP-DP-12) 17 p.

278. UNITED STATES. DEPARTMENT OF COMMERCE. BUREAU OF THE CENSUS. Republic of Korea. Washington, D.C., U.S. Government Printing Office, June 1978. (Country Demographic Profiles ISP-DP-17) 26 p.

279. UNITED STATES. DEPARTMENT OF COMMERCE. BUREAU OF THE CENSUS. Thailand. Washington, D.C., U.S. Government Printing Office, April 1978. (Country Demographic Profiles ISP-DP-15) 36 p.

280. UNITED STATES. DEPARTMENT OF COMMERCE. BUREAU OF THE CENSUS. World population 1977. Recent demographic estimates for the countries and regions of the world. Washington, D.C., U.S. Government Printing Office, 1978. 449 p.

281. UNITED STATES. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE [DHEW]. PUBLIC HEALTH SERVICE. NATIONAL INSTITUTES OF HEALTH. Birth control planning. In: DHEW. Public Health Service. National Institutes of Health. A barefoot doctor's manual. (Translation of a Chinese instruction to certain Chinese health personnel) Washington, D.C., U.S. Government Printing Office, 1974. (NIH 75-695) p. 173.

282. VALLIN, J. La nuptialité en Tunisie. [Nuptiality in Tunisia.] [FR] Population 26: 250-266. March 1971.

283. VAN DE WALLE, E. Age at marriage and fertility. IPPF Medical Bulletin 7(3): 1-2. June 1973.

284. VAN DE WALLE, E. Demographic aspects of marriage in tropical Africa. In: International Union for the Scientific Study of Population [IUSSP]. International Population Conference, London 1969. Vol. 3. Liège, Belgium, IUSSP, 1971. p. 2167-2179.

285. VAN DE WALLE, E. Marriage in African censuses and inquiries. In: Brass, W., Coale, A.J., Demeny, P., Heisel, D.F., Lorimer, F., Romaniuk, A., and van De Walle, E., eds. The demography of tropical Africa. Princeton, New Jersey, Princeton University Press, 1968. p. 183-238.

286. VAN DE WALLE, E. The relation of marriage to fertility in African inquiries. Demography 2: 302-308. 1965.

287. VAN DUSEN, R.A. The study of women in the Middle East: some thoughts. Middle East Studies Association Bulletin, May 1976. p. 1-20.

288. VIEL, B. Patterns of induced abortion in Chile and other Latin American countries. In: Pan American Health Organization [PAHO]. Epidemiology of abortion and practices of fertility regulation in Latin America: selected reports. Washington, D.C., PAHO, 1975. p. 1-8.

289. VIEILLE, P. Iranian women in family alliance and sexual politics. In: Beck, L. and Keddie, N. Women in the Muslim world. Cambridge, Massachusetts, Harvard University Press, 1978. p. 451-472.

290. WARE, H. Women's work and fertility in Africa. In: Kupinsky, S., ed. The fertility of working women: a synthesis of international research. New York, Praeger, 1977. p. 1-30.

291. WELLER, R.H. Demographic correlates of woman's participation in economic activities. In: International Union for the Scientific Study of Population [IUSSP]. International Population Conference, Mexico 1977, Vol. 3. Liège, Belgium, IUSSP, 1977. p. 497-515.

292. WESTOFF, C.F. and RYDER, N.B. Differential fertility. In: Westoff, C.F. and Ryder, N.B. The contraceptive revolution. Princeton, New Jersey, Princeton University Press, 1977. p. 277-309.

293. WITKE, R. Mao Tse-tung, women and suicide. In: Young, M.B., ed. Women in China: studies in social change and feminism. Ann Arbor, Michigan, University of Michigan, Center for Chinese Studies, 1973. (Michigan Papers in Chinese Studies No. 15) p. 7-31.

294. WORLD BANK. World tables 1976. Baltimore, Maryland, Johns Hopkins University Press, 1976. p. 510-513.

295. WORLD FERTILITY SURVEY. The Pakistan fertility survey 1975: a summary of findings. Voorburg, Netherlands, International Statistical Institute, November 1977. (World Fertility Survey 3) 13 p.

296. WORLD HEALTH ORGANIZATION [WHO]. SCIENTIFIC GROUP. Induced abortion. Geneva, Switzerland, WHO, 1978. (Technical Report Series No. 623) 65 p.

297. WORRALL, J. African women: a long way to go. Christian Science Monitor (Boston, Massachusetts), July 31, 1979. p. 2.

298. YALMAN, N. Under the Bo tree. Los Angeles, California, University of California Press, 1971. 406 p.

299. YAUKEY, D. Marriage reduction and fertility. Lexington, Massachusetts, D.C. Heath, 1973. 115 p.

300. YEMEN ARAB REPUBLIC. COUNCIL OF MINISTERS. CENTRAL PLANNING BOARD. General census of houses and population 1975. Preliminary results. 3rd ed. [EN, AR] Yemen Arab Republic, Council of Ministers, Central Planning Board, August 1976. p. 18-19, 25-26, 29.

301. YOUSSEF, N.H. Female status and fertility in North Africa and the Arab Middle East: a problematic relationship. Presented at the Population Association of America, Montreal, Canada, 1976. 13 p.

302. YOUSSEF, N.H. The status and fertility patterns of Muslim women. In: Beck, L. and Keddie, N. Women in the Muslim world. Cambridge, Massachusetts, Harvard University Press, 1978. p. 69-99.

303. ZATUCHNI, G.I. The Middle East and North Africa. Iran. Studies in Family Planning 6(8): 302-304. August 1975.

ADDENDA

304. ALIHONOU, E. [Legal age at marriage in Benin] Personal communication, August 28, 1979.

305. ANKER, R. and KNOWLES, J.C. A micro-analysis of female labour force participation in Africa. In: Standing, G. and Sheehan, G. Labour force participation in low-income countries. Geneva, Switzerland, International Labour Office, 1978. p. 137-163.

306. BALDWIN, C.S. Policies and realities of delayed marriage: the cases of Tunisia, Sri Lanka, Malaysia, and Bangladesh. PRB Report 3(4): 1-11. September 1977.

307. BANKS, J.A. Prosperity and parenthood: a study of family planning among the Victorian middle classes. London, Routledge & Kegan Paul, 1954. 240 p.

308. BARBERIS, M. [Minimum legal age at marriage in selected countries] Personal communication, August 20, 1979.

309. CARTER, H. and GLICK, P.C. Marriage and divorce: a social and economic study. Rev. ed. Cambridge, Massachusetts, Harvard University Press, 1976. 508 p.

310. CARVAJAL ALVAREZ, J. Uso de anticonceptivos [Use of contraceptives] [SP] In: Asociación Demográfica Costarricense, Dirección General de Estadística y Censos, and Westinghouse Health Systems. Informe de la encuesta nacional de uso de anticonceptivos, Costa Rica-1978. [Report of the national survey of contraceptive use, Costa Rica-1978] San José, Dirección General de Estadística y Censos, November 1978. p. 42-64.

311. CHULALONGKORN UNIVERSITY. INSTITUTE OF POPULATION STUDIES, and NATIONAL STATISTICAL OFFICE. POPULATION SURVEY DIVISION. The survey of fertility in Thailand. Country report, Vol. 2. Bangkok, Thailand, Chulalongkorn University and National Statistical Office, 1977. (World Fertility Survey) (Survey of Fertility in Thailand, Report 1) 524 p.

312. COALE, A.J., GOLDMAN, N., and CHO, L.-J. Nuptiality and fertility in the Republic of Korea. Presented at the International Union for the Scientific Study of Population Seminar on Nuptiality and Fecundity, Bruges, January 8-11, 1979. 23 p.

313. COSTA RICA. DIRECCION GENERAL DE ESTADISTICA Y CENSOS. Encuesta nacional de fecundidad, 1976, Costa Rica. [National fertility survey, 1976, Costa Rica] [SP] San José, Costa Rica, September 1978. (World Fertility Survey) 369 p.

314. DE TRAY, D.N. Age of marriage and fertility: a policy review. Pakistan Development Review 16(1): 89-100. Spring 1977.

315. FERRANDO, D. and FERNANDEZ, R. Estudio del Peru. (Documento de Trabajo para el Panel de América Latina, Santiago, 16-20 de Julio, 1979.) [Study of Peru. (Working paper prepared by Panel of Latin America, Santiago, Chile, July 16-20, 1979.)] [SP] Santiago, Chile, Centro Latinoamericano de Demografía, 1979. 39 p.

316. FIJI. BUREAU OF STATISTICS. Fiji fertility survey, 1974. Principal report. Suva, Fiji, Bureau of Statistics, December 1976. (World Fertility Survey) 563 p.

317. FORD, K. Contraceptive use in the United States, 1973-1976. Family Planning Perspectives 10(5): 264-269. September-October 1978.

318. FRANCOIS, M. Gabon. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 630-656.

319. FREEDMAN, R., HERMALIN, A.I., and SUN, T.H. Fertility trends in Taiwan: 1961-1970. In: Liu, P.K.C., ed. Essays on the population of Taiwan. Nankang, Taipei, Taiwan, Academia Sinica, Institute of Economics, 1973. p. 31-56.

320. GABON. EMBASSY. [Minimum legal age at marriage] Personal communication, August 20, 1979.

321. GAISIE, S.K. Population growth and its components. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 346-366.

322. HAILE, D. and YIMER, E. Law and population growth in Ethiopia. Medford, Massachusetts, Tufts University, Fletcher School of Law and Diplomacy, 1976. (Law and Population Monograph Series No. 35) 52 p.

323. KNODEL, J. and VAN DE WALLE, E. Lessons from the past: policy implications of historical fertility studies. Population and Development Review 5(2): 217-245. June 1979.

324. McCARTHY, J. [Johns Hopkins University] [Costa Rican family planning program] Personal communication, October 9, 1979.

325. NORTMAN, D.L. and HOFSTATTER, E. Population and family planning programs. 9th ed. New York, Population Council, 1978. 92 p.

326. NOTESTEIN, F.W. Population: the long view. In: Schultz, T.W., ed. Food for the world. Chicago, Illinois, University of Chicago Press, 1945. p. 40-41.

327. OZBAY, F., SHORTER, F., and YENER, S. Accounting for the trend of fertility in Turkey. Presented at the UN/UNFPA Expert Group Meeting on Demographic Transition and Socioeconomic Development, Istanbul, Turkey, April 27-May 4, 1977. (ESA/P/AC.8/CRP.6) 28 p.

328. POOL, D.I. The rural-urban fertility differential in Ghana. In: International Union for the Scientific Study of Population [IUSSP]. International Population Conference, London 1969, Vol. 1. Liège, Belgium, IUSSP, 1971. p. 826-840.

329. RECCHINI DE LATTES, Z. and LATTES, A.E. La población de Argentina. [The population of Argentina.] [SP] [Paris, France], CICRED, 1974. (CICRED Series: Argentina) 212 p.

330. RETHERFORD, R.D. and OGAWA, N. Decomposition of the change in the total fertility rate in the Republic of Korea, 1966-1970. Social Biology 25(2): 115-127. Summer 1978.

331. TAPINOS, G. and PIOTROW, P.T. Six billion people: demographic dilemmas and world politics. New York, McGraw-Hill, 1978. 218 p.

332. UNITED NATIONS. EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION [UNESCO]. Statistical yearbook 1977. [EN, FR, SP] Paris, France, UNESCO, 1978. 1064 p.

333. UNITED STATES. DEPARTMENT OF COMMERCE. BUREAU OF THE CENSUS. Chile. Washington, D.C., U.S. Government Printing Office, February 1978. (Country Demographic Profiles ISP-DP-13) 20 p.

334. UNITED STATES. DEPARTMENT OF COMMERCE. BUREAU OF THE CENSUS. Costa Rica. Washington, D.C., U.S. Government Printing Office, August 1977. (Country Demographic Profiles ISP-DP-4) 20 p.

335. UNITED STATES. DEPARTMENT OF COMMERCE. BUREAU OF THE CENSUS. Panama. Washington, D.C., U.S. Government Printing Office, November 1977. (Country Demographic Profiles ISP-DP-7) 22 p.

336. VON ELM, B.R. Determinants of age at first marriage: a study of West Malaysia. Presented at the annual meeting of the Population Association of America, Atlanta, Georgia, April 13-15, 1978.

337. YOUSSEF, N., BUVINIC, M., KUDAT, A., SEBSTAD, J., and VON ELM, B. Women in migration: a third world focus. Washington, D.C., International Center for Research on Women, June 1979. (AID/otr-G-1592) 170 p.

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PROSTAGLANDINS

Population Information Program, The Johns Hopkins University, Hampton House, 624 North Broadway, Baltimore, Maryland 21205, USA

The Use of PGs in Human Reproduction

Summary. Recent studies from around the world show that prostaglandins play a major role in human reproduction and indeed in many other vital processes. Clinical application of PGs now includes management of obstetrical complications and cervical priming as well as induction of labor and termination of first and second trimester pregnancies. Further research is focusing on new prostaglandin analogues derived from naturally occurring PGE_1, PGE_2, and $PGF_{2\alpha}$. These analogues are longer lasting and more potent. Because they are more specific in their impact, they are less likely to produce undesirable side effects. Drugs that inhibit PG synthesis or block the action of PGs are being investigated to treat dysmenorrhea and have a wide range of potential clinical uses.

Current clinical uses of prostaglandins in reproductive health care depend on at least two different actions of PGs:

(1) as a smooth muscle stimulant, directly or indirectly producing or augmenting uterine contractions;
(2) as a priming agent, altering and softening the structure of the cervix to bring about dilation.

A third possible role is as a luteolytic agent — that is, an agent inhibiting the corpus luteum from producing the progesterone necessary to maintain pregnancy. This action, although documented in various animals, has not been proven in humans but remains a research goal.

Although widely hailed in the late 1960s as a potential abortifacient, PGs were first approved by drug regulatory agencies for induction of labor as well. PGE_2, given intravenously, extraamniotically, orally, or vaginally, has proved an acceptable substitute in many cases for the customary procedure of rupturing the membranes (amniotomy) and intravenously infusing oxytocin. The 0.5 mg oral tablets approved for marketing in 1975 in Britain are popular with both women and health personnel because they avoid the more confining intravenous procedure. Medical practice differs with respect to induction of labor. In the US induction is discouraged except for clear medical reasons, and intravenous infusion of oxytocin is preferred to provide immediate control over dosage. Such control is especially important with prostaglandins since the margin between an effective dose and an overdose (which might cause fetal distress) is narrow.

The tablets, as well as suppositories and PG gels, have also been used vaginally and intracervically to soften, or prime, the cervix before induction of labor. Since a soft, effaced, and dilated cervix is a key factor facilitating delivery, the use of PGs to speed this process is an important clinical application.

To date, PGs have been least successful in the role originally expected to be their most important application — terminating early first trimester pregnancies without need for surgical procedures. Chiefly because of the incidence of incomplete abortions and also because of the relatively long time required and the frequent side effects of pain, vomiting, and diarrhea, many clinicians have been reluctant to substitute PG injections or suppositories for vacuum aspiration, which is now the standard medical procedure for termination of first trimester pregnancy.

Testing New Analogues

Studies are underway using several new PG analogues which are potent over a longer time period and produce fewer gastrointestinal side effects. To terminate very early pregnancies (up to seven weeks from the last menstrual period) some of the new analogues, in suppository and injection form, are now approaching vacuum aspiration in effectiveness. For example, sulprostone has proved 96 percent effective in inducing menstrual bleeding an average of three to four hours after intramuscular injections. So far PGs have been available only through hospital pharmacies or on an investigational basis. Therefore, it is impossible to determine whether, given a choice, women would prefer a rapid surgical procedure such as vacuum aspiration performed in a clinic or a longer process of menstrual induction by intramuscular injection or self-administered suppositories. Additional research is needed, not only on the safety and effectiveness of different PG analogues,

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This issue of **Population Reports** was prepared by Leah Jeanne Gail, Ph.D., on the basis of published and unpublished materials, correspondence, and interviews. Comments and additional material are welcome.

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but also on the needs and preferences of the women using these services in different countries. In the long run, acceptability, costs, and, above all, availability will play an important role in determining which procedures are used.

These analogues are also being evaluated for terminating second trimester pregnancy, a more difficult procedure. Another new $PGF_{2\alpha}$ analogue, 15-methyl-$PGF_{2\alpha}$ (tromethamine salt), was licensed in 1979 in India for use by the intramuscular, intraamniotic, and vaginal routes and in the US as an intramuscular injection. It is more effective than natural PGs, but gastrointestinal side effects still occur in the majority of women. The analogue in methyl ester form has been investigated in suppositories, with effectiveness rates of 90 percent and above but no improvement in rates of incomplete abortion and side effects.

Combination procedures are now frequently used for second trimester terminations. For example, lower doses of intraamniotic $PGF_{2\alpha}$ are being administered together with oxytocic agents such as urea. Laminaria to help dilate the cervix are now utilized with PGs as well as with vacuum techniques. These combinations reduce the time interval to fetal expulsion and minimize the risk of injury to the cervix.

Already $PGF_{2\alpha}$ frequently is injected intraamniotically for second trimester terminations instead of the customary procedure of hypertonic saline instillation. In the US about 15 to 20 percent of second trimester abortions are now performed with PGs, including an increasing number of procedures where PGs are combined with other uterus-stimulating agents. But controversy over the relative safety of various procedures has not been resolved. In data gathered by the World Health Organization, the US Center for Disease Control, and the Indian Council of Medical Research, certain complications — infection, bleeding, and rehospitalization — are more frequent with $PGF_{2\alpha}$ than with saline. US data suggest that mortality with the two methods is not significantly different. Indian data show higher mortality with saline. A third procedure — dilatation and evacuation (D&E) — is also under study and is being used safely and effectively in the US by qualified and experienced practitioners up to 16 weeks of gestation. Debate continues over which technique is preferable at what period of pregnancy and under what conditions, but it is too early to reach conclusions. One incontrovertible finding is that the risks of abortion increase in direct proportion to the length of gestation. In the US, for example, mortality ranges from 0.5 per 100,000 procedures before 8 weeks to 9.9 between the 13th and 15th weeks, 16.3 between the 16th and 20th weeks, and 27.9 after 21 weeks.

PGs and Obstetrical Complications

Prostaglandins have become a promising method for induction of labor in cases of intrauterine death and similar obstetric complications. They are more effective than oxytocin and less dangerous than saline and may eliminate need for surgical intervention. In a large study with PGE_2 suppositories, over 95 percent of women with fetal death were delivered successfully and in a short time. Intramuscular injections have proved effective in small studies, but experience is too limited to indicate the best route of administration. D&E is also used now for missed abortion. PGs have been used successfully to initiate labor in cases of anencephaly (a congenital defect in which much of the fetal brain is absent) and, followed by curettage, in cases of hydatidiform mole (a benign cystic tumor derived from conceptual tissue).

An important new use of PGs is to stop postpartum bleeding. Clinicians have found that 15-methyl-$PGF_{2\alpha}$, injected intramuscularly, is highly effective in managing this common complication of delivery.

The same qualities that make PGs useful in bringing on labor and abortion probably produce the menstrual pain and discomfort known as dysmenorrhea. Antiinflammatory drugs which inhibit the synthesis of prostaglandin have been used successfully to treat both primary dysmenorrhea and some types of secondary dysmenorrhea, for example, after IUD insertion. For the many women who have suffered this kind of debilitating menstrual pain and associated malaise, research on PGs has helped produce safe, specific, and welcome relief. PG synthesis inhibitors are also used to stop premature labor.

It is increasingly clear that both PGs and PG inhibitors play an important role in the reproductive process. As the study of PGs continues and as new analogues are developed and tested, the clinical uses of these remarkable and ubiquitous compounds will undoubtedly multiply. Research on prostaglandins demonstrates once again that scientific advances often come not only from the expected directions but also from unanticipated new applications. **End of Summary.**

Because of the specialized scientific nature of this repon, the full text will not be translated into other languages. A summary version will be available in French, Spanish, Portuguese, and Arabic. Additional copies of the English text will be provided on request.

BACKGROUND

The first reference to a substance in the female reproductive system that might have been prostaglandin was an account in 1920 from Vienna of a menstrual poison — a substance in perspiration on the hands of a menstruating woman that had the power to wither roses (385). In several experiments the Viennese physician B. Schick also tried to test the old wives' tale that a menstruating woman could prevent bread from rising or wine from fermenting, but the results were inconclusive (385). Soon thereafter, other researchers observed that something in breast milk and in acetone extracts of menstrual fluid was toxic to primroses (307, 308). Vernon R. Pickles subsequently repeated the experiment with primroses and identified prostaglandins in menstrual fluid as the "menstrual toxin" involved (354, 355).

The official history of prostaglandins usually begins in 1930, when Raphael Kurzrok and Charles C. Lieb in the US reported that semen caused strips of human uterus to relax or contract (256). In the mid-1930s Maurice Goldblatt in the United Kingdom (164) and Ulf S. von Euler in Sweden (470) independently noted that secretions and extracts from prostate glands and seminal fluids lowered blood pressure in animals and stimulated the uterus. In 1935, von Euler coined the name "prostaglandin" to denote the active principle which he at first thought was secreted by the prostate gland (471). Subsequently it was established that prostaglandins are not a single compound produced by the prostate gland, but rather a group of 14 related polyunsaturated fatty acids — 20-carbon molecules each consisting of a 5-carbon ring and two side chains — produced by the male seminal vesicles and most other mammalian tissues.

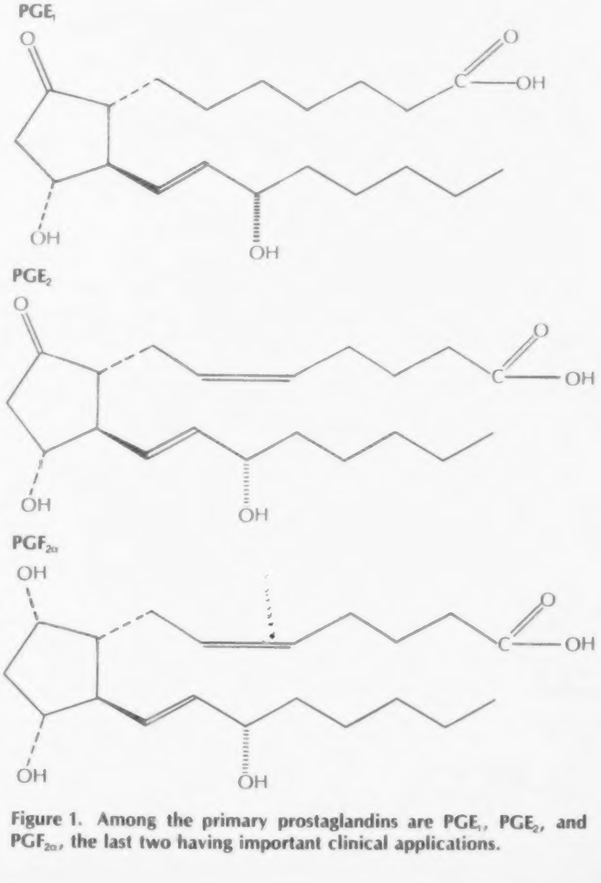
By 1960 Sune Bergström and colleagues at the Karolinska Institute in Stockholm had isolated two different prostaglandin compounds: the one more soluble in ether was named PGE; the one more soluble in phosphate buffer (spelled with an F in Swedish), PGF (24, 25). With financial assistance from the Upjohn Company, Bergström procured some 4,200 kg of sheep seminal vesicles for analysis. From this biological material he was able to determine the chemical structure of several PGs (23).

PGs have been classified into so-called primary PGs — including PGE_1, PGE_2, PGE_3, $PGF_{1\alpha}$, $PGF_{2\alpha}$, and $PGF_{3\alpha}$; other natural PGs, such as PGAs and PGBs; several equally potent endoperoxide precursors, such as PGG_2 and PGH_2; and the much less active PG degradation products (metabolites). Related to the PGs are two recently discovered classes of powerful regulators of blood clotting, the prostacyclins (PGI_2), having an extra 5-membered endoperoxide ring between Carbon 6 and Carbon 9, and the thromboxanes, with two endoperoxide rings between Carbons 9 and 11, and 11 and 12 (see Figure 1 and Figure 2, p. G-80).

Synthesis and Research Progress

Until the mid-1960s, research on PGs was limited by the difficulty and expense of isolating a sufficient quantity of the substance from animal material. In 1965 both the Karolinska research group (21), working with Unilever Research Laboratories in the Netherlands (467), and the Upjohn Company (13) developed a biosynthetic laboratory technique to produce PGs through an enzymatic conversion of fatty acids. By the late 1960s both Upjohn (357) and Harvard University chemist E.J. Corey (101, 506, 518) had devised a commercially feasible total synthesis of PGs, which greatly facilitated mass production for laboratory and clinical research. In tandem with improved production came improved means to measure PGs. First, the cumbersome bioassays of animal organs gave way to the highly technical process of gas-liquid chromatography with mass spectrometry, capable of measuring nanogram quantities (169, 171, 377); then this in turn gave way to the more efficient radioimmunoassays, which can measure picogram quantities (102, 170, 244, 283, 284).

Raphael Kurzrok and Charles C. Lieb are shown recording uterine contractions on a large kymograph in the New York laboratory where they first investigated the action of prostaglandins, circa 1930.



PGE_1

PGE_2

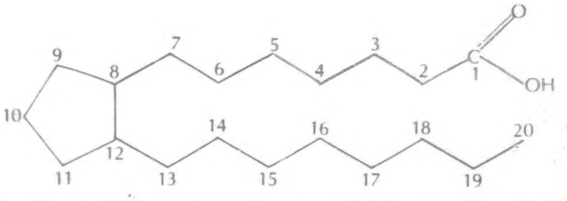
$PGF_{2\alpha}$

Figure 1. Among the primary prostaglandins are PGE_1, PGE_2, and $PGF_{2\alpha}$, the last two having important clinical applications.

Naming Prostaglandins

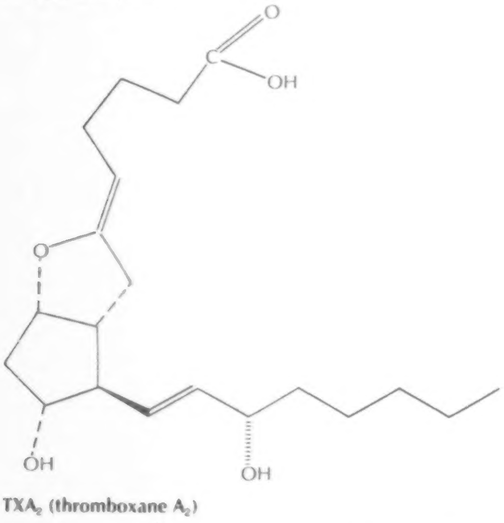
Three conventions govern the apparently complex PG nomenclature. First, the capital letter after "PG" refers to the chemical structure of the five-membered ring. Originally E stood for ether and F for phosphate buffer, indicating the substance in which the prostaglandin was more readily dissolved. Second, the subscript numeral tells how many double bonds, or unsaturated functions, are present in the two side chains of the molecule. These double bonds are normally located at the carbon atom C-13 in PG_1s; at C-5 and C-13 in PG_2s; and at C-5, C-13, and C-17 in PG_3s. Third, the Greek letter subscript α or β describes which direction in space the hydroxy groups on the side chains take relative to the plane of the ring. A hypothetical PG molecule, "prostanoic acid," illustrating the structure and numbering system of the molecule, is shown below. See Figures 1, 2, 5, and 7 for chemical formulas of most of the PGs mentioned in this issue of **Population Reports**.

"Prostanoic acid"



An early clinical investigator of the role of prostaglandins in obstetrics was Sultan M.M. Karim, then at Makerere University Medical School in Uganda. Karim reported in 1966 that he had found endogenous prostaglandins in human amniotic fluid after the spontaneous rupture of fetal membranes during labor (220). In 1968, with intravenous $PGF_{2\alpha}$ he successfully induced labor in 9 out of 10 women (233). Concurrently, Marc Bygdeman and colleagues induced labor contractions in four women with PGE_1 and in three with PGE_2 infused intravenously (70). These were the first reports on clinical effects of prostaglandins applied to the human uterus and the first deliberate use of prostaglandins in the management of human pregnancy. Soon thereafter Karim documented a correlation between blood levels of endogenous prostaglandins and frequency of uterine contractions (219)—an observation that has only recently been verified, using sophisticated fractionation methods in vitro (524).

PGI_2 (prostacyclin)



TXA_2 (thromboxane A_2)

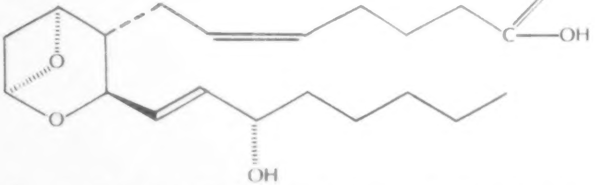


Figure 2. Related to PGs, two newly discovered classes of compounds, the prostacyclins and the thromboxanes, are powerful regulators of blood clotting.

Basic and clinical research with prostaglandins has increased in proportion to the availability of compounds for study. With increasing research, evidence has accumulated that PGs are active throughout mammalian reproductive systems. By the late 1970s, PGs were known to be involved in hypothalamic and pituitary hormone releases, ovulation, development of the corpus luteum (luteinization), regulation of the estrous cycle in domestic animals, contraction of the uterus in spontaneous abortion and labor, ejaculation, sperm transport, fertilization, and testosterone production.

In addition to their role in reproduction, PGs are involved in an extremely wide range of cellular processes. For example, in 1979 the elusive "slow reacting substance" (SRS) known to be involved in asthmatic reactions (90) was found to be related to PGs. It is a member of a newly identified family of arachidonic acid derivatives called leukotrienes; SRS is now renamed leukotriene C (332). Because of the ubiquitous activity of PGs, clinical applications currently suggested or under investigation include treatment of gastric ulcer, hypertension, asthma, peripheral vascular disease (including diabetic ulcers and Raynaud's disease), clotting disorders related to thrombosis, shock, stroke, heart attack, and keeping open the ductus in newborns until corrective surgery can be performed.

Evidence that prostaglandins could be used to stimulate labor at term and to induce abortion led in the late 1960s and early 1970s to substantial funding for research. Persistent side effects such as vomiting and diarrhea have substantially limited their use, however. Current research is focusing on practical applications of both naturally occurring PGs and various synthetic PG analogues to find the best routes of administration, the most effective doses, and the lowest incidence of side effects and to determine the relative safety of PGs used either separately or in conjunction with other labor- or abortion-inducing drugs. Drug companies have concentrated on developing new analogues and new delivery systems, such as suppositories and Silastic vaginal inserts. The World Health Organization, which established a Task Force on the Use of Prostaglandins for the Regulation of Fertility in 1972, is gathering clinical data from comparative international trials on different routes of PG administration for first and second trimester abortion and for cervical priming before vacuum aspiration (489).

Current Use

The first PGs approved for clinical use were $PGF_{2\alpha}$ and PGE_2; they were first marketed in the United Kingdom in 1972 for induction of labor (administered intravenously and extraamniotically) and for therapeutic abortion (administered extraamniotically) (412). The following year use of $PGF_{2\alpha}$ was authorized in the US for second trimester abortion by intraamniotic instillation. PGE_2 in the form of tablets was approved in the UK in 1975 for induction of labor, and PGE_2 in the form of vaginal suppositories was introduced in the US in 1977 for second trimester abortion, missed abortion, intrauterine death up to 28 weeks gestation, and hydatidiform mole. These drugs can be obtained only through hospital pharmacies and research institutions. Since 1973 $PGF_{2\alpha}$ has been registered by the Upjohn Company — that is, submitted to and approved by the appropriate government licensing agency — in 25 countries including Australia, Canada, New Zealand, South Africa, Switzerland, Taiwan, and West Germany. PGE_2 is registered by Upjohn in 15 countries including Australia, Belgium, Canada, the UK, Guatemala, Hong Kong, and Mexico. Registration does not necessarily mean that the product is currently marketed in the area, however (10). The ONO Pharmaceutical Company of Japan markets $PGF_{2\alpha}$ in Japan for intravenous and extraamniotic use and also in Korea, Taiwan, and Brazil, and PGE_2 in the form of tablets for oral use in Japan and also in Korea and Taiwan (449). (See Table 1.)

Synthetic derivatives, or analogues, of the natural PGs have been used in clinical research since 1972, when pilot studies with 15-methyl-$PGF_{2\alpha}$ and 15-methyl-PGE_2 were first reported (62, 231, 245). These analogues incorporate chemical variations of the natural PGs that prolong PG activity in the body by blocking the action of metabolizing enzymes. This permits lower or less frequent doses. Furthermore, the analogues can be injected intramuscularly or infused intravenously, whereas the parent compounds — $PGF_{2\alpha}$ especially — would cause local pain and redness. In 1979, 15-methyl-$PGF_{2\alpha}$ was licensed in the US and India.

Several newer PG analogues are being evaluated clinically. A PGE_2 derivative called sulprostone, developed by Pfizer Incorporated, USA, and Schering AG, Berlin, has been tested extensively for cervical dilation and induction of abortion. It can be injected intramuscularly. Even without premedication against side effects, almost no women experience fever or diarrhea, and the incidence of vomiting is low. Clinical tests are nearly complete enough to permit an application for marketing in West Germany (387). A PGE_1 analogue in the form of vaginal suppositories has been tested for abortion in Japan by ONO

Table 1. Characteristics and Applications of Major Prostaglandins

Name	Major Uses[1]	Common Routes[2]	Potency Relative to $PGF_{2\alpha}$	Manufacturer and Brand Name	Where Registered
$PGF_{2\alpha}$	2nd trimester abortion Labor induction	IA, IV, EA IV	1	Upjohn "Prostin F2 Alpha"	25 countries worldwide, including Australia, Brazil, Mexico, UK, US
				ONO "Prostarmon-F" ONO "Prostaglan"	Japan, Korea, Taiwan Brazil
15-methyl-$PGF_{2\alpha}$ (tromethamine salt)	1st & 2nd trimester abortion Intrauterine death *To stop postpartum bleeding*	IA, IM, VL IM *IM*	10	Upjohn "Prostin/15M"	India, US
15-methyl-$PGF_{2\alpha}$, methyl ester	*1st & 2nd trimester abortion* *Cervical dilatation before 1st trimester abortion*	*S, D* *S*	100	Upjohn	
PGE_2	2nd trimester abortion Intrauterine death & mole Labor induction *Cervical dilatation before labor induction*	S S OT, *VT* *EA, OT, VT, EG*	10	Upjohn "Prostin E2"	15 countries worldwide (Europe, Western Hemisphere, Pacific), including Guatemala, Hong Kong, UK, US)
				ONO "Prostarmon-E"	Japan, Korea, Taiwan
				Upjohn UK "Prostin E2" (OT)	UK
16,16-dimethyl-PGE_2	*1st trimester abortion* *Cervical dilatation before 1st trimester abortion*	*S* *S*	100	Upjohn Canada	
16-phenoxy-ω-tetranor-PGE_2 methyl sulfonylamide (sulprostone)	*1st & 2nd trimester abortion* *Cervical dilatation before 1st trimester abortion*	*IV, IM, EA* *IM, IC*	100	Schering AG	
16,16-dimethyl-trans-Δ^2-PGE_1 methyl ester (ONO-802)	*1st & 2nd trimester abortion*	*S, EA*	100	ONO	
9-deoxo-16,16-dimethyl-9-methylene-PGE_2	*2nd trimester abortion*	*S*	15	Upjohn	

[1] Uses and routes approved by at least one national drug regulatory agency appear in roman type; experimental uses, in italic type.

[2] EA = extraamniotic; IA = intraamniotic; IM = intramuscular; IV = intravenous; S = vaginal suppository; D = vaginal device; OT = oral tablet; VT = oral tablet administered vaginally; VL = vaginal liquid; IC = intracervical; EG = endocervical gel.

Pharmaceutical Company. Side effect rates are considerably lower than those caused by currently available PGs. This derivative may be submitted to the Japanese health ministry for licensing in 1980 (449). Development of another PGE derivative, 9-deoxo-16,16-dimethyl-9-methylene-PGE_2, has recently been announced by the Upjohn Company, USA. Reportedly it is more stable than PGE_2, and its effects are more specific to the uterus. Preliminary clinical trials show that it is effective for early and midtrimester abortion by several routes of administration and for cervical dilatation with reduced gastrointestinal side effects (66, 462). Finally, some progress has been made in synthesizing PG derivatives with heightened luteolytic activity in animals, that is, the ability to block progesterone production by the corpus luteum. These compounds have not yet been tested in women, who have not shown the luteolytic effects of PGs that are commonly observed in lower species. (See "Mode of Action," below, and "New Derivatives," pp. G-107–110.)

MODE OF ACTION

Basically, PGs function like hormones, regulating a vast array of physiologic processes. Unlike hormones as classically defined, however, PGs are made on demand and are released by unspecialized cells. Naturally occurring PGs usually act within the cell or organ where they are released. They are deactivated instantaneously, generally without a measurable increase in the level of PG circulating in the blood. Because of this local action, PGs resemble the intracellular messenger molecule cyclic-3′,5′-adenosine monophosphate (cyclic AMP, or cAMP). In fact, PGs act on many of their target cells — for example, corpus luteum cells — by joining with the appropriate cell membrane receptor molecule to produce an increase in cAMP (439). In other target tissues — for instance, the myometrium, or uterine muscle — PGs act by causing the release of calcium ions into the cell (77).

The role that PGs play in mammalian reproduction is still not entirely clear, but to date at least three different functions have been identified by which PGs may affect pregnancy. These are:

(1) as a smooth muscle stimulant, acting directly and/or indirectly on the myometrium, causing it to contract.

(2) as a cervical primer, changing the structure of the cervix to hasten the process known as cervical ripening.

(3) as a luteolytic agent (luteolysin), inhibiting the ability of the corpus luteum to secrete the female hormone progesterone, which is necessary to maintain pregnancy. This effect has been observed in many mammals but not in humans.

The first two functions have important clinical applications not only for first or second trimester abortion but also for assuring safe delivery at term, for treating various complications of pregnancy, and perhaps eventually for understanding and treating a wide range of menstrual and reproductive disorders.

Stimulating Uterine Contractions

The role of PGs in stimulating the uterine muscle was one of the first to be discovered (163, 256) and today forms the basis for the principal clinical applications of PGs.

The natural PGs PGE_2 and $PGF_{2\alpha}$ and all currently available analogues act on the uterus, whether in initiating labor, abortion, or even menstrual cramps, by stimulating the muscle tissue, or myometrium. Despite contradictory reports from very early work on PGs, the current consensus is that $PGF_{2\alpha}$ stimulates the uterus in all conditions, whether pregnant or not, at any stage of pregnancy, in vitro or in vivo. On the other hand, PGE_2, which during pregnancy is about five times as potent a uterine stimulant as $PGF_{2\alpha}$, in vitro relaxes tissue from a nonpregnant uterus (148). In fact, PGE_2 reverses the contractile effect of $PGF_{2\alpha}$ under certain conditions — for example, in an isolated myometrium from a nonpregnant woman (60, 382) or during normal menstruation (301, 302).

The biochemical basis for this direct action of PGs on the uterine muscle is still being explored. There are many PG receptors on the sarcoplasmic reticulum of the myometrium, that is, the intracellular membrane responsible both for conducting the signal to contract to the myometrial fibers and for initiating the contraction itself (78). PGE_2 and $PGF_{2\alpha}$ cause this membrane to release bound calcium ions into the cell fluid. These calcium ions in turn trigger contraction of the muscle fibers (77). Unlike oxytocin, which can stimulate the uterus only when pregnancy is near term, PGs can promote calcium release in either the pregnant or the nonpregnant myometrium. In this role as a muscle stimulant, PGs have an opposite effect from progesterone since progesterone encourages the sarcoplasmic reticulum to retain calcium, thus quieting uterine activity (76).

PGs may act elsewhere in the uterus. For example, they probably constrict blood vessels sufficiently to account for part of the discomfort of dysmenorrhea (see pp. G-103–105). Arpad I. Csapo has suggested that constriction of the uterine and placental blood vessels is one of the first events in the abortion process. Since he believes that the uterine muscle is at first unresponsive to stimulants like oxytocin or PGs, he hypothesizes that administering PGs causes an acute vasoconstriction, cutting off the blood supply to the placenta ("prostaglandin impact") (110). This, in turn, according to Csapo, reduces the progesterone supply ("progesterone withdrawal") enough to make the myometrium receptive to PGs, exogenous or endogenous, so that it will start contracting regularly (110). Clinical observations (114, 115) and data from PG assays during abortion (174) suggest that endogenous PG production may be necessary to continue the abortion process, supplementing the exogenous PG dose.

Another newly discovered class of PGs, the prostacyclins (PGIs), also acts on the myometrium, although, as with other PGs, some of the emerging reports are contradictory. Most initial reports show that prostacyclin (PGI_2) applied in vitro relaxes both the pregnant and nonpregnant human myometrium (342, 382). In one study, PGI_2 counteracted contractions evoked by $PGF_{2\alpha}$ (345). Another study described a biphasic effect of PGI_2 — an initial stimulation followed by relaxation (345). A third study found that PGI_2 stimulated uterine contractions (483). Some of these differences may have occurred because laboratories use different incubation media, with different calcium concentrations. In any case, the discovery of the prostacyclins and their uterine-regulating potential has opened new opportunities for PG research.

Priming the Cervix

The most recently identified role of prostaglandins in reproduction is their role in softening and dilating the cervix, sometimes referred to as "cervical priming" or "ripening." At first, many investigators assumed that PG-induced uterine contractions indirectly dilated the cervix (292, 293). More recently it has become evident that PGs, especially PGE_2, also specifically alter the structure of the connective tissue of the cervix. Several

PG analogues are capable of dilating the pregnant cervix in 6 to 12 hours. This finding suggests that PGs, PG analogues, and conversely also PG inhibitors may soon play a much larger role in the management of pregnancy, abortion, and labor.

The human cervix is a barrel-shaped organ. Its function during pregnancy is to remain tightly closed, then in labor to become effaced, or flattened, so that the shape of the internal os and cervical canal is lost, and finally during delivery to dilate at the external os so that the fetus can be expelled (see Figure 2). The bulk of the cervix consists of connective tissue — protein collagen fibers, smaller reticulum fibers, their mucopolysaccharide sheaths, and a gellike interstitial substance, or matrix. During the course of pregnancy the proportion of gel to collagen fiber increases, the reticulum fibers align with the collagen fibers, and the water content of the gel increases slightly (48). As delivery approaches, the collagen fibers dissociate and branch out like a rope fraying (48). New synthesis of glycosaminoglycan (mucopolysaccharide) and a significant loss of the protein content of the collagen also have been observed (120). Thus, the early concepts of the cervix as a sphincter, as merely an elastic girdle responding to contractions of the uterine body, or as a sponge absorbing more water at dilation are inaccurate. The structure of the cervix itself actively changes during dilation.

Current research implicates PGs in these processes. Unlike oxytocin, $PGF_{2\alpha}$ and PGE_2 actually decrease cervical stiffness (stretch modulus, a measure of resistance to stretching) when added to portions of human cervical tissue in vitro (507). For women whose labor was induced by oral PGE_2, the stretch modulus of connective tissue from the cervix (measured in vitro) was about half that of tissue from women whose labor was spontaneous or induced by oxytocin (99). Preliminary studies with the nonpregnant cervix in vitro suggest that arachidonic acid, a PG precursor, or its metabolites may stimulate collagen breakdown during cervical ripening (198, 475). A study on sheep provides direct evidence that endogenous PGE synthesis increases in the cervix during labor to effect cervical dilation and softening. The PGE production rate, measured in vitro by radioimmunoassay, was fourfold higher at delivery than in late pregnancy (146).

PGs are now being used for cervical priming at the time of delivery and before induced abortion. Natural PGs have been used much more often to induce labor, and PG analogues, in early abortion. Endocervical gels and suppositories as well as intramuscular and intracervical injections are being developed and improved for this new clinical use of PGs.

Luteolysis

By far the most tantalizing function of PGs in the domain of human reproduction, from both the theoretical and clinical viewpoints, is as a luteolytic agent, or luteolysin — that is, an agent which can prevent the corpus luteum of the ovary from secreting progesterone. This progesterone is necessary to prepare the uterus for implantation of a fertilized egg and to maintain pregnancy until about the ninth week, when the placenta gradually takes over this function (113, 117, 329, 450). Therefore, any interruption in the production of progesterone by the corpus luteum can interrupt early pregnancy.

Do PGs prevent the corpus luteum from producing progesterone? To date the answer is "yes" in some animals but "not proven clinically" in human females.

Since 1969, when Bruce Pharriss and colleagues reported that $PGF_{2\alpha}$ caused luteolysis in the rat (352), several lines of evidence have accumulated indicating that $PGF_{2\alpha}$ is a luteolysin in most laboratory and domestic animals. For example, (1) administration of $PGF_{2\alpha}$ causes luteolysis in cows, gerbils, hamsters, guinea pigs, horses, mice, monkeys, pigs, rabbits, and rats; (2) at the time of luteolysis higher levels of $PGF_{2\alpha}$ are found in the blood of sheep, pigs, cows, and guinea pigs; (3) administration of PG synthesis inhibitors prevents luteolysis in guinea pigs, rabbits, and rats; and (4) immunization against $PGF_{2\alpha}$ prolongs the life span of the corpus luteum in guinea pigs and sheep (203).

The precise mechanism by which $PGF_{2\alpha}$ causes the corpus luteum to stop secreting progesterone and to regress in these animals is not known. A once popular theory that $PGF_{2\alpha}$ acts indirectly, by restricting ovarian blood circulation, has been disproved in several animals (47, 209, 246). Blood flow is in fact reduced, but after progesterone secretion has diminished (348). Current evidence suggests that $PGF_{2\alpha}$ acts directly on luteal tissue; this conclusion is based on tissue culture experiments with rats (121), rabbits (336), hamsters (14), monkeys (94), pigs, and cows (191). Some studies suggest that $PGF_{2\alpha}$ may affect luteal function by acting on cyclic AMP, which serves as a mediator of PG action in many target tissues (439). Another

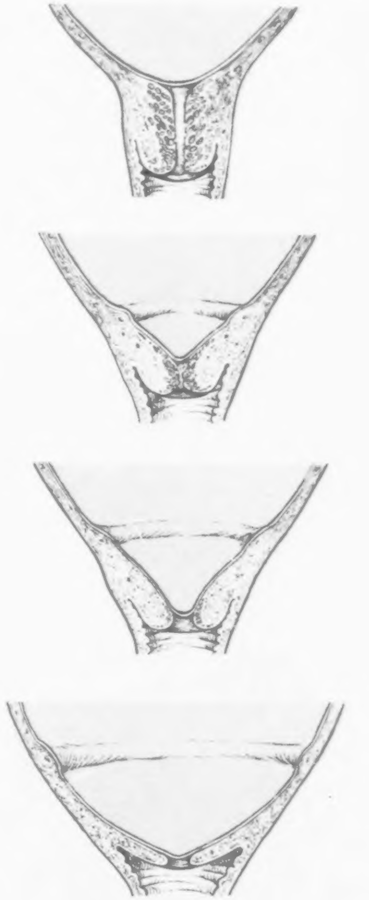


Figure 3. During labor the cervix changes physical shape, in part because of uterine contractions and the pressure of the fetal head upon it and in part because of changes in the consistency of cervical tissue. PGs can hasten these changes. The nulliparous cervix, at the end of pregnancy, is shown at top. During labor the cervix becomes increasingly effaced (second and third drawings). As delivery approaches, the cervical canal disappears entirely (bottom).

Source: adapted from Hellman et al. (512)

Prostaglandins in Male Reproductive Physiology

Prostaglandins were named for the prostate gland because they were discovered in semen and assumed to originate in that gland. Nevertheless, the role of PGs in male reproduction has not received as much attention as their role in female reproduction.

The major PGs in human semen are 19-hydroxy-PGE_1 and 19-hydroxy-PGE_2; their levels are about four times those of PGE_1 and PGE_2 (213, 429). These 19-hydroxy-PGs primarily inhibit uterine activity rather than stimulate it, as PGE_1 and PGE_2 do (374). This finding confirms previous observations that human semen relaxes myometrium in vitro and the uterus when deposited intravaginally (144, 145).

A variety of findings show that PGs may play some role in male fertility and thus may warrant further attention:

- In a group of men with otherwise unexplained infertility, seminal PG levels were lower than normal (64); in another small series, infertile men had significantly depressed levels of 19-hydroxy-PGEs (286).
- A group of infertile men with normal sperm counts did not show significantly lower PG levels compared with fertile men with similar sperm counts, but men with abnormally high sperm counts (9 of 10 of them infertile) had 19-hydroxy-PG levels in their seminal plasma significantly lower than normal (237).
- Exogenous male hormones elevate hydroxy-PG levels in semen (406) and improve sperm motility (46). Thus it has been suggested that androgen treatment might improve fertility in men with low hydroxy-PG levels, which can easily be monitored by thin-layer chromatography (285).
- Aspirin, a PG synthesis inhibitor, lowers the PG content of semen (97), but the consequent effects of PG synthesis inhibitors on fertility have not been fully examined.
- By means of gas chromatography–mass spectrometry, prostaglandins and their metabolites in human prostate gland have been quantified. Since PGs are synthesized and degraded in this tissue, they probably have a physiological role in the prostate (100).

The significance of these findings for theoretical understanding of male fertility—whether these PGs have a role in sperm activation or transport in the female reproductive tract—remains to be clarified. So does their practical application to the management of male infertility.

possibility is that $PGF_{2\alpha}$ acts by altering calcium flux within the luteal cell membrane (14).

In women, however, administration of exogenous prostaglandins apparently does not cause the corpus luteum to regress. Most early attempts to induce luteolysis with PGE_2 and $PGF_{2\alpha}$, generally in the mid or late luteal phase of the menstrual cycle in nonpregnant women, were unsuccessful (36, 195, 211, 212, 214, 278, 282, 444). Some investigators observed a decline in progesterone, but it was transient (107, 143, 281, 451, 480).

Yet many are reluctant to concede that the luteolytic effect of PGs clearly seen in animals is totally absent in humans. Indeed, there is reason to expect that PGs will be shown to act somehow, perhaps through an indirect mechanism, on the human corpus luteum so as to inhibit or reduce progesterone secretion. Some of the steps in this process have already been identified. First, the necessary anatomical connection between the uterus and ovary, a tortuous overlapping of uterine veins on the ovarian arteries, has been identifed in human specimens (16) as well as in cows, hamsters, rats, and sheep (203). Second, $PGF_{2\alpha}$ receptors have been discovered in the cell membranes of the human corpus luteum (359, 365), a prerequisite if $PGF_{2\alpha}$ is to act on target cells in the corpus luteum; one group reported a change in the dissociation constant, a measure of the affinity of this receptor for the PG, after abortion by vacuum aspiration (359). Third, another fine point in the luteolytic mechanism well documented in animal experiments has now been observed in human luteal tissue: in human granulosa cells (precursors to luteal cells) cultured in vitro, $PGF_{2\alpha}$ does reduce progesterone release (325). Fourth, some have speculated that $PGF_{2\alpha}$ does have a luteolytic effect in women but that it acts only within the ovary and not when administered systemically. In one experiment, exogenous $PGF_{2\alpha}$ was injected directly into the ovary and produced luteolysis (248). Fifth and finally, measurements show elevated amounts of endogenous $PGF_{2\alpha}$ in ovarian venous blood at the time of luteolysis (2). These data and speculations keep alive the possibility that in the future PGs could be used to regulate human luteal activity, although the effect will probably not be as direct as was once expected.

The search for a measurable luteolytic effect continues. For example, in recent tests three days before expected menstruation 16 normally cycling women took 2.0 or 3.0 mg of 15-methyl-$PGF_{2\alpha}$ methyl ester in a single vaginal suppository for a total of 35 cycles. Among these women eight pregnancies were subsequently documented by radioimmunologic hCG pregnancy tests. As expected from previous research, in women who were not pregnant there was no change in progesterone levels, although these women had some spotting and cramps. Their menses occurred on schedule. In the eight women later found to have been pregnant, however, heavy bleeding began within hours and levels of human chorionic gonadotropin (hCG) dropped from the high readings characteristic of pregnancy (242). It is not possible to determine from this evidence whether uterine contractions disrupted the placenta, cutting off that source of progesterone, or whether the PG had a luteolytic effect in women newly pregnant but not in nonpregnant women about to menstruate.

These clinical results are comparable to those reported when other PGs were used in larger doses to terminate confirmed early pregnancies (see p. G-90). In studies of early abortion, women who aborted completely experienced a drop in progesterone to about 35 to 50 percent of initial values in 24 hours, then to about 10 percent in one week (103, 316, 318, 370). These studies leave open the possibility that some luteolytic action occurs when PGs are administered to a pregnant woman.

INDUCTION OF LABOR

For more than a decade, PGs have been used on an experimental basis to induce labor. In this use, the action of PGs in stimulating uterine contractions is paramount. The route initially tested by Karim in Uganda in 1968 was intravenous (224, 233). Extraamniotic and oral administration and vaginal gels and tablets followed. Although both $PGF_{2\alpha}$ and PGE_2 have been tested in clinical trials, PGE_2 is now preferred because of its cervical priming action. The synthetic PG analogues generally have not been employed to induce labor since there is no information about their effects on the fetus.

PGE and $PGF_{2\alpha}$ administered intravenously for induction of labor were approved in the United Kingdom in 1972. In 1975 stable 0.5 mg oral tablets of PGE_2 also were approved in the UK. In the US the use of prostaglandins to induce labor, that is, as an oxytocic, has not yet been authorized by the Food and Drug Administration.

Medical practices with respect to induction of labor differ in the US and Europe. In the US, induction of labor is permitted only for medical reasons; intravenous oxytocin infusion allows close monitoring and permits an immediate halt to administration if contractions become too strong or fetal distress develops. In Europe induction of labor is more common. Thus much of the research on PGs for induction of labor has been undertaken in the UK.

Whether induction is planned for maternal or fetal indications, PGs now offer an alternative to the standard technique of artificial rupture of the membranes (amniotomy) and intravenous infusion of oxytocin. Although it is difficult to compare inductions of labor by PGs and by oxytocin because of differences in the selection of subjects, dose schedules, treatment protocols, and criteria for success, both $PGF_{2\alpha}$ and PGE_2 are considered to be as effective as oxytocin in inducing uterine contractions at term (6).

With respect to side effects and ease of administration, each method and route has advantages and disadvantages for specific women and in particular medical environments. In general, the advantages of PGs are: they do not require intravenous infusion; they do not contribute to excess water retention, which is a special problem for women with eclampsia, hypertension, or heart or kidney disease; and they help to ripen the cervix. On the other hand, compared with oxytocin, PGs have the disadvantage of a much narrower dosage margin. There is only a narrow range of doses that are effective without causing excessive gastrointestinal side effects — diarrhea, nausea, and vomiting — and possibly overstimulating the uterus and adversely affecting fetal circulation (70, 437). The thrust of current clinical research on PGs, therefore, is to develop routes of administration and procedures that minimize this disadvantage, that are acceptable to women in labor, and that are easily utilized by medical or paramedical personnel.

Comparing Intravenous PGs and Oxytocin

Since obstetricians were accustomed to administering oxytocin intravenously, the first clinical trials of $PGF_{2\alpha}$ and PGE_2 to induce labor at term also utilized this route (224, 233). With PGE_2, the effective dose range is about 0.5 μg per minute, increasing to about 2.0 μg (147, 224); the effective therapeutic range for $PGF_{2\alpha}$ is 5 to 20 μg per minute (148). (This can be compared with the usual infusion of oxytocin at about 2 mU/minute, adding to or doubling the dose every 30 or 60 minutes until regular labor contractions are established.)

Mean induction-to-delivery intervals with intravenous PGE_2 range from 2.6 hours in multiparas having elective inductions (418) to 9.25 hours in women with unripe cervices and medical indications for induction (205). Primiparas average two to three hours longer than multiparas. These intervals are comparable to those observed with oxytocin (404).

The qualitative and quantitative characteristics of uterine contractions induced by PGs differ very little from those displayed in spontaneous or in oxytocin-induced labor. Both the amplitudes and the frequencies of contractions are in the same ranges, and the shapes of the recorded curves are comparable. Clinically, PG-induced contractions are considered indistinguishable from spontaneous contractions.

In comparison with oxytocin, which is effective at intravenous doses ranging from 2 to 32 or more mU per minute, $PGF_{2\alpha}$ has a narrower range of dose response: only four- or fivefold increases in dose are tolerated. Because there is such a narrow margin of tolerance between the threshold of desired uterine activity and overactivity, PGs are more difficult to manage than oxytocin. If uterine pressure surpasses 12 mm of mercury between contractions without a return to resting tone, hypertonus, or excess tension, has developed. Hypertonus may impair placental blood flow and cause the fetal heartbeat to slow down (bradycardia), possibly resulting in a depressed, oxygen-starved baby. Fetal heart rate anomalies associated with hypertonus have been reported in 3.6 and 5.5 percent of women receiving intravenous PGE_2 and $PGF_{2\alpha}$, respectively (433, 437) (see Table 2). Resulting fetal distress is probably less common, its reported frequency depending on the criteria used.

At first PGs seemed to produce hypertonus more often than oxytocin did, especially if they were infused intravenously (70, 437). More recent research casts doubt on this conclusion. Comparing the results of 2,834 spontaneous, oxytocin-induced, oxytocin-augmented, and oral PGE_2-induced labors, Emanuel A. Freidman and Marlene R. Sachtleben found higher rates of abnormal contractions with each of the three oxytocic regimens than in spontaneous labor. Moderate to severe variable slowing of the fetal heart rate occurred significantly more often with oxytocin augmentation than in normal labor, but was not more frequent with PGE_2. Moderate to severe late slowing of fetal heart rate occurred significantly *less* often with PGE_2 than in normal labor when the associated uterine contractions were normal or sustained (tetanic) (152).

Anesthesia may aggravate the effect of PGs on the uterus. Michel Thiery and colleagues recorded several times as many incidents of uterine hyperactivity and fetal bradycardia in groups of women given continuous epidural anesthesia (injections of local anesthetic into the lumbar spine above the dura membrane) as in matched controls also induced by amniotomy and intravenous PGE_2 or $PGF_{2\alpha}$ but without anesthesia (435). Since hypertonus was sometimes seen immediately after a dose of anesthetic, the researchers suggested that anesthesia in combination with PGs may overstimulate the uterus. Furthermore, they documented fetal heart rate anomalies alone, without associated uterine hypertonus, and noted that fetal scalp pH, one measure of fetal distress, was significantly lower (more acid) on the average in the anesthetized groups. They recommended that local or regional anesthesia not be administered during PG-induced labor except with very close monitoring (435).

A further disadvantage of PGs in inducing labor is side effects, although these are being reduced with new vaginal delivery systems. PGs may cause gastrointestinal disturbances, usually in the form of occasional vomiting. Clinically, this provides a safety factor, since nausea usually precedes uterine hypertonus, but of course vomiting makes PGs less acceptable to women. The incidence of gastrointestinal side effects ranges from 4 to 20 percent during intravenous infusion (433, 437) (see Table 2). Side effects are more frequent in primigravidas and in women with unfavorable cervices, who need higher doses of PGs to initiate effective labor.

Oral Administration

The development of a stable tablet for oral use represents an important gain in acceptability for the woman and in ease of management for medical personnel. In most studies, however, oral administration appears to be slightly less effective than intravenous or vaginal administration (see Table 2).

PGE_2 was originally administered orally in aqueous solution, an effective but bitter-tasting drug. It was inconvenient for medical personnel to use since the unstable PGE_2 had to be prepared fresh. Since 1975, stable 0.5 mg tablets for oral use have been available in the United Kingdom (10). Oral doses are taken at 30 to 60 minute intervals, starting with a single tablet and gradually increasing to a maximum of four tablets (2.0 mg) at a time. Plasma levels of the first PGE_2 metabolite, 15-keto-PGE_2, reach peak values 45 minutes after ingestion, establishing this dose rate as appropriate (165).

The incidence of gastrointestinal side effects ranges from 2 (190) to 55 percent (273), but usually amounts to 10 percent or less. There are fewer complaints with the tablets than with PGE_2 solution (140).

With oral tablets, vomiting reduces the likelihood of successful induction and lengthens delivery intervals, particularly in primigravidas who need higher doses, because vomiting produces a wide variation among individuals in absorption of the PG. Vomiting may serve as a warning that increased doses would produce hypertonus. Hypertonus and fetal distress appear to be less frequent with oral tablets than with intravenous administration (see Table 2).

A recent retrospective study in Great Britain of 144 routine inductions of labor with the 0.5 mg PGE_2 tablets showed that multiparas were more often successful than primiparas. Success clearly depended on the dose and the side effect rate. The 36 percent who did not achieve prompt delivery included 15 percent who had to withdraw because of gastrointestinal side effects and 6 percent whose contractions faded after they vomited. To limit side effects, the clinicians conducting this study recommended not exceeding a dose rate of 1.0 mg per hour, a

Table 2. Labor Induction with Prostaglandins, by Route of Administration and Type of PG, Selected Studies, 1972-1979

Author & Date	Ref. No.	No. of Women	Selection Criteria	Dosage	Other Techniques Used	Effectiveness (%)	Mean Hours Induction to Delivery (Nullip./Parous)	Maternal Side Effects (%)[a]	Uterine Hypertonus/Fetal Heart Rate Anomalies (%)	Cesarean Section Required (%)
Intravenous/PGE_2										
Thiery et al. 1975	437	55	elective	initially 0.1 μg/minute, doubled every 30 minutes to maximum 3 μg/minute	initial amniotomy, no anesthesia	100	5.8/3.3	V: 20	NR/3.6[b]	1.8
Thiery et al. 1977	435	53	elective	initially 0.2 μg/minute, doubled every 30 minutes to maximum 2 μg/minute	initial amniotomy, epidural block with bupivacaine	100	5.9/4.5	V: 13.2	47/13	1.7
Intravenous/$PGF_{2\alpha}$										
Thiery et al. 1977	435	64	elective	initially 2 μg/minute, doubled every 30 minutes to maximum 30 μg/minute	initial amniotomy, epidural block with bupivacaine	97	7.1/4.1	V: 16.7	29/10.9	1.7
Oral[c]/PGE_2										
Ang et al. 1978	7	153	medically indicated	0.5 mg/hour × 4, then 1.0 or 1.5 mg/hour	initial amniotomy	91	8.1	GI: 9.2	NR	3.9
Elder & Stone 1975	141	91	medically indicated, mainly postmaturity or hypertension	0.5 mg/hour × 2, then 1.0 mg/hour × 2, then 1.5 mg/hour	initial amniotomy	91	11.2/7.5	GI: 15	0/0	3.3
Gordon-Wright et al. 1979	167	80		0.5 mg/hour × 2, then 1.0 mg/hour × 2, then 1.5 mg/hour	initial amniotomy	66	6.8	GI: 15	3.8/0	9

NR = not reported

[a] V = vomiting; GI = gastrointestinal; D = diarrhea

[b] Hypertonus and fetal heart rate anomalies; one fetal death due to heart defect.

[c] Oral tablets except as noted

[d] Oral gelatin capsules

(continued on next page)

policy that would discourage the use of this method for women delivering for the first time (167).

In centers where nursing staff, intravenous infusion pumps, and electronic monitors are in limited supply, the oral PGE_2 tablets have provided a safe and convenient alternative to intravenous infusion of oxytocin (7, 157, 448, 497). Uterine activity and fetal condition were assessed frequently, and if any signs of fetal distress appeared, monitoring of labor began. In this way the majority of these PG-induced labors were managed without the amount of staff attention needed for intravenous infusion or continuous fetal monitoring. Even where inducing labor by intravenous oxytocin is the rule, both the nursing staff and the women in labor have appreciated the freedom from infusion pumps that oral PGE_2 tablets afford (167, 331). (In Scandinavia, oxytocin is also administered by nasal spray or sublingually — that is, under the tongue — to provide the same freedom of movement (151). Trained midwives adhere strictly to a gradually escalating dose protocol because, when administered by these routes, oxytocin absorption is variable, and the dose cannot be regulated once it is administered. The same precautions need to be taken with PGE_2 given by oral or vaginal routes.)

Avoiding the immobility required for intravenous infusion and bedside fetal monitoring may actually hasten delivery. Using a newly developed telemetry device for remote reading of fetal heart rate and uterine activity, West German researchers monitored 35 women in whom labor was induced by oral PGE_2 tablets and compared them with 40 similar women monitored while lying in hospital beds (416). The women with the device were allowed to move, sit, stand, and walk around freely (416). Compared with the women immobilized in bed, these women needed less analgesia and fewer PGE_2 tablets, took less time to deliver, and their infants had slightly higher mean blood pH and Apgar scores (rapid assessments of newborns' clinical condition based on a combination of factors). The better results were attributed to the opportunity to maintain an upright posture, which assists the woman in labor and allows gravity to hasten fetal expulsion (510).

Vaginal Tablets and Suppositories

The 0.5 mg oral tablets have been used vaginally on an experimental basis to induce labor. This route of administration has not been approved in the US or the UK. PGE_2 suppositories for vaginal use are made by hospital pharmacies for research purposes and have not been marketed by any drug companies to

Table 2. (Continued)

Author & Date	Ref. No.	No. of Women	Selection Criteria	Dosage	Other Techniques Used	Effectiveness (%)	Mean Hours Induction to Delivery (Nullip./Parous)	Maternal Side Effects (%)[a]	Uterine Hypertonus/Fetal Heart Rate Anomalies (%)	Cesarean Section Required (%)
Gordon-Wright et al. 1979 (continued)		36		0.5 mg/hour × 2, then 1.0 mg/hour × 2, then 1.5 mg/hour	no amniotomy	53	10.9	NR	0/2.7	11
		28	to augment labor	0.5 mg/hour × 2, then 1.0 mg/hour × 2, then 1.5 mg/hour		71	7.3	NR	NR	0
Karim & Sharma 1972[d]	230	1,000	almost all medically indicated	initially 0.5 mg, increasing in 0.5 mg steps up to 2.0 mg per application, given at 2-hour intervals (for maximum 48 hours) until adequate uterine stimulation or 6 cm cervical dilation achieved	amniotomy at 6 cm dilation	90	NR	V: 6.5 D: 3.4	NR	6.1
Thiery et al. 1974	436	50	elective	0.5 to 1 mg every 2 hours	initial amniotomy, no anesthesia	98	6.8/4.4	V: 23.4	0/0	0
Vaginal tablets/PGE_2										
Gordon-Wright & Elder 1979	168	505	medically indicated	single dose: 1 mg 2 mg 3 mg 4 mg 5 mg	no amniotomy	34 41 57 70 63	10.8 6.6 7.7 6.4 8.1	none	0/0	NR
Vaginal suppositories/PGE_2										
Shepherd et al. 1979	401	352	medically indicated, favorable cervix	3 mg, single	amniotomy after labor established	100	12.5/7.2	NR	0.3/0	4.8
		150	as above but unfavorable cervix		as above, plus one or two 3 mg PGE_2 priming doses	95	16.0/10.0	NR	0/0	20.7

date. Experience with these methods in the UK is limited but promising.

One large study has applied the 0.5 mg PGE_2 tablets intravaginally, either alone or with other procedures. In London, initial research on a small group of women found that the 15-keto metabolite of PGE_2 climbed to peak plasma levels in about three hours, although the levels did not appear to be clearly dose-related (168). Then, clinical trials were expanded to include 505 women from two different hospital populations. They received single doses of 1, 2, 3, 4, or 5 mg PGE_2 in tablets without prior amniotomy. Within comparable groups, success rates were proportional to dose, ranging from 34 percent in the 1 mg group to 70 percent in the 4 mg group. Neither gastrointestinal side effects nor uterine hypertonus was observed among these women, even though the single dose was higher than that generally used orally. The researchers noted that this method was more effective than intravenous oxytocin alone, more acceptable to laboring women, and more convenient for the attending staff than combining amniotomy with oxytocin, even though the combined amniotomy/oxytocin procedure was more effective than PGE_2 alone (168).

Another large study of labor inductions used 3 mg PGE_2 vaginal suppositories. The treatment protocol called for a 3 mg vaginal suppository immediately upon hospital admission, the evening before formal induction, for women with a poor prognosis for labor. The following morning all women, regardless of prognosis, received a 3 mg suppository, followed by amniotomy after regular contractions developed. The overall effectiveness rate was 98 percent. Induction-to-delivery times ranged from 16.0 hours (counting from the second, inducing dose) in primigravidas with poor prognosis to 7.2 hours in multigravidas with favorable prognosis. In primiparas with poor prognosis, adding the priming dose the evening before induction cut the cesarean section rate from 42 to 21 percent (401).

While all of these formulations and routes are still being tested, the evidence available suggests that prostaglandins, especially PGE_2, can play an important role in the induction of labor. Gastrointestinal side effects continue to trouble 10 or 20 percent of women, especially primiparas, but the high incidence of vomiting and diarrhea reported in early studies is now being reduced with oral and, especially, vaginal use. The most serious complication — uterine hypertonus with fetal distress — occurs less frequently as practitioners gain experience with PGs. At the same time, new attention is focusing on the use of PGs in cervical dilation, a key factor in preparing a woman for labor.

CERVICAL PRIMING

Significant improvements in the outcome of labor can be achieved by use of PGE_2 to prepare, or prime, the cervix before induction of labor. Cervical priming differs from induction of labor in that it is intended to dilate, soften, and efface the cervix without necessarily starting strong uterine contractions; by contrast, induction of labor involves administering an oxytocic, or uterine-stimulating drug, and rupturing the amniotic sac in order to initiate the physiological process by which the fetus is expelled from the uterus.

To a woman whose cervix is uneffaced, closed, and firm, low doses of PGE_2 are easily administered, the evening before induction, in the form of oral tablets, vaginal suppositories, or endocervical gels. This cervical priming procedure causes almost no discomfort and does not commit the obstetrician to formal labor induction if the cervix does not dilate sufficiently. The priming dose of PGE_2 not only makes labor less painful but also increases the likelihood of successful labor induction, shortens delivery time, reduces the number of cesarean sections, and in many cases brings on a more natural labor without the need for artificial induction. Cervical priming is also effective when induction of labor before term is indicated for medical reasons or before abortion procedures (see pp. G-93–95).

One of the most important factors affecting the success of labor induction is "inducibility" — a condition largely determined by the clinical appearance of the cervix. This is usually expressed in terms of the Bishop score, which assigns points for cervical consistency, effacement, position, dilation, and for the position of the presenting part of the fetus, on a scale of 1 to 13 (30). For example, a woman with a long, closed, firm, and uneffaced cervix would score only between 0 to 3. The Bishop score is particularly useful in primiparas for predicting the length of the first stage of labor. For example, primiparas with a Bishop score of 0 to 2 took six hours longer for cervical dilation than did primiparas with a score of 3 to 5 — a difference that was not seen in women with previous births (434).

Extraamniotic Administration

To determine the best route of administration for cervical priming, PGE_2 has been tested extraamniotically, orally, and vaginally. In several studies, PGE_2 has been administered extraamniotically in viscous gel at a priming dose of less than 1 mg. Gastrointestinal side effects have been minimal (see Table 3). The increases in Bishop scores ranged from 3.0 (75) to 4.9 points (402, 432, 485), improving the cervical status of these women from poor to favorable. These effects are comparable to those obtained with the use of laminaria (258).

Labor was often shorter than in women with similar initial Bishop scores who did not receive cervical priming treatment — in one series, 25 percent shorter (75). In one study, primigravidas with initial Bishop scores of three or less and medical indications for labor induction were in labor for an average of 10.7 hours, compared with 14.9 hours for similar controls without PGs (75). PGE_2 causes mild uterine contractions, sometimes felt as slight backache, and in these studies induced labor without further intervention in 20 (75) to 53 percent (402).

With PG priming, A.A. Calder and colleagues documented a lower incidence of depressed infants: 6.6 percent with Apgar scores of four or less versus 23 percent of untreated controls; a lower cesarean section rate: 14 percent versus 32 percent in controls; and a lower frequency of maternal fever: 4.1 percent versus 32 percent in controls (75).

A balloon catheter developed by Edward M. Southern of the Upjohn Company can combine slow mechanical dilatation, by inflation of the balloon in the cervical canal, with extraamniotic administration of PGs or other oxytocic fluids by means of a tube through the balloon. A pilot study of the device utilized a single 100 μg dose of PGE_2 in most cases, with a second dose in a few instances. In 17 women using the device for three hours, mean cervical dilation was 10.5 mm; in 43 women using the device for six hours, 12.7 mm. At this low PG dose, gastrointestinal side effects are few (410).

Table 3. Cervical Priming with Prostaglandins, Selected Recent Studies, 1977-1979

Author & Date	Ref. No.	No. of Women	Selection Criteria	Priming Agent	Route	Dosage	Increase in Bishop Score (points)	%Women in Labor during Priming	Mean Hours Induction to Delivery
Calder et al. 1977	75	121	obstetric indications	PGE_2	extraamniotic	240, 400, or 480 μg	3.0	20	10.7
		31		none			NR	NR	14.9
MacKenzie & Embrey 1979	311	48	primigravidas, medical & obstetric indications	PGE_2	vaginal gel	5 mg	8.4	69	8.6
				$PGF_{2\alpha}$	vaginal gel	25 mg	2.2	13	10.6
O'Herlihy & MacDonald 1979	337	65	primigravidas, Bishop scores 0-3, 1/3 elective	PGE_2	vaginal gel	2 mg	6.6	48	8.5
		30		placebo			0.7	0	13.9
Pearce 1977	350	25	obstetric & medical indications	PGE_2	oral tablet	0.5 mg/hour × 10	3.3	20	NR
		23		placebo			1.6	4	NR
Steiner et al. 1979	419	18	para 1-4, medical indications	PGE_2	endocervical gel	0.1 mg	3.1	NR	4.0
		10				0.2 mg	7.4	NR	
		10				0.3 mg	NR	NR	
Wilson 1978	485	15	primigravidas, obstetric indications	PGE_2	extraamniotic	400 μg	4.5	33	7.3
		15		PGE_2	vaginal tablet	2 mg	2.5	20	10.2
		15		PGE_2	oral tablet	1 mg/hour × 10	1.6	0	12.7
		15		oxytocin	intravenous	initially 1 mU/minute, increasing as needed to maximum 128 mU/minute	1.1	0	13.8

NR = not reported

Oral Tablets

The 0.5 mg oral tablets have been tested for cervical priming but have proved less effective than extraamniotic treatment. The increase in cervical score — 1.6 to 4.2 points (464, 485) (see Table 3) — and the proportion of women going into labor before planned induction — 20 to 28 percent (350, 478) — were both less with oral tablets than with extraamniotic administration. One research group, administering 1 mg PGE_2 per hour orally for three doses, failed to find any significant improvement over placebos in the proportion beginning labor before induction or any reduction in the induction-to-delivery interval (161). The total dose of oral PGE_2 appears to influence results. Women taking 1 mg PGE_2 hourly for five hours achieved a mean increase in Bishop score of 2.0 points, excluding 44 percent who went into labor after priming (264). By contrast, another group, administered 1 mg per hour for 10 doses, recorded a mean increase of 4.2 points and a highly significant reduction in mean induction-to-delivery times compared with untreated controls and with women given 30 international units of oxytocin over 10 hours (464). In a study comparing extraamniotic, oral, and vaginal PGE_2 and intravenous oxytocin, the oral route was judged the least effective for prostaglandins on the basis of change in cervical score, percentage of women going into labor during priming and delivery intervals (485).

Vaginal Gels and Tablets

PGE_2 has been used vaginally for cervical priming, both in a viscous gel and in the standard tablet form. In one comparative study the vaginal route produced results midway between the extraamniotic and oral routes, when assessed on the basis of improvement in Bishop score, percentage of women in labor before induction, and delivery interval (485).

Ian Z. MacKenzie and Mostyn P. Embrey of the UK have done extensive work with PGE_2 vaginal gels for cervical priming in primiparas who required induction of labor for medical reasons. In these studies, which included women with both favorable and unfavorable Bishop scores, cervical priming produced shorter duration of labor, less need for epidural anesthesia, fewer cesarean sections, and higher Apgar scores than induction of labor without priming (310). MacKenzie and Embrey demonstrated that the number of women going into spontaneous labor during priming was proportional to PG dose and that the length of labor was inversely related to cervical score after priming, regardless of whether the women required subsequent labor induction (312). In these primigravidas, a single 5 mg dose of PGE_2 gel increased Bishop scores by a mean of 8.4 points and started labor in 69 percent. These double-blind studies also tested $PGF_{2\alpha}$: 25 mg of $PGF_{2\alpha}$ raised cervical scores by only 2.3 and brought on labor in only 13 percent (311).

Very low doses — 0.1 to 1.0 mg — of PGE_2 in a viscous gel have also been deposited endocervically (into the cervical canal) for cervical priming. Increases in cervical scores, extent of cervical dilation, and percentage of women going into labor all were dose-related. In an average of 2.6 hours after administration, all women receiving PG priming doses showed significant improvements in Bishop scores. For these parous women, labor lasted an average of 4 hours (419). PGE_2 by this route was clearly more effective than a placebo (487) or low dosages of oxytocin (455). The endocervical route may approach the vaginal route in effectiveness; more comparative studies are needed to settle this point.

In contrast to PG doses for labor induction, cervical priming doses are so low that uterine hypertonus is rare. If it occurs the fetus is usually not affected. Mean peak pressure during uterine contractions initiated by the priming dose of PGE_2 has been recorded at 19 mm Hg, and pressure was never higher than 80 mm (419). The contraction frequency was 3.1 per 10 minutes, compared with 2.6 in controls given placebos (161).

Gastrointestinal side effects are infrequent, having been reported in only three studies. In two, fewer than one percent reported diarrhea and vomiting (312, 432); in the third, 21 percent experienced gastrointestinal side effects, including nausea (264). Shivering or transient fever was equally rare. Thus, for reasons of effectiveness, safety, and acceptability, PGE_2 is likely to be used increasingly for cervical ripening, either in conjunction with induction of labor or as an alternative procedure which may make induction unnecessary.

Extraamniotic administration appears to be the most effective route, based on studies so far, but vaginal tablets and endocervical gels have also produced good dilation with few side effects.

FIRST TRIMESTER ABORTION

When the first uses of prostaglandins to induce labor and to terminate pregnancy were reported in the late 1960s, some expected that these compounds could serve as a noninvasive, chemical method for early abortion (218). Subsequent research, however, while yielding new analogues, has not yet produced a first trimester PG method that is so easily managed that it can be widely used. For widespread use, a technique for first trimester termination should yield a very high rate of effectiveness, few incomplete abortions, a low incidence of minor side effects, no serious complications, and, preferably, should require only a single application that can be self-administered. To date vacuum aspiration meets most of these criteria better than prostagladins. With PGs, 5 to 15 percent of early terminations end in failure or incomplete abortion, requiring medical follow-up; uterine pain can be severe enough to require parenteral medication; and gastrointestinal side effects are a persistent problem. Furthermore, the absence of a proven luteolytic effect in women so far limits the usefulness of PGs in the first few weeks of pregnancy, when such a procedure would be especially useful because vacuum aspiration is less reliable then than it is after about the eighth week of pregnancy (136, 150). Nonetheless, PGs offer privacy and the potential for wide availability not possible with a clinic procedure. In the US and the UK, prostaglandins have not been licensed for first trimester use except on an investigational basis.

Nevertheless, research continues, especially into the development of vaginal suppositories containing PG analogues. These produce higher rates of effectiveness and completeness with fewer side effects than natural PGs or PGs administered by other routes. They are now being tested by the World Health Organization in Cuba, Egypt, Hong Kong, Hungary, India, Japan, Norway, Singapore, Sweden, Tanzania, the UK, the US, and Yugoslavia (489). New analogues are also being tested for intramuscular use. An alternative use of PGs in first trimester abortion, also being studied now, is dilation of the cervix before vacuum aspiration.

Among the prostaglandins, the natural PGs PGE_2 and $PGF_{2\alpha}$ are effective in the first trimester only by the intrauterine extraovular route and at doses so high that sedation for side effects is necessary. The analogues — especially 15-methyl-$PGF_{2\alpha}$ and 16,16-dimethyl-PGE_2 — are more effective than the natural PGs and more easily administered — intramuscularly and as suppositories — because they are longer acting. For example, the half-life of 15-methyl-$PGF_{2\alpha}$ in the circulation is 5 minutes; that of $PGF_{2\alpha}$ is 20 seconds (69). Because the analogues act more specifically on the uterus, they cause fewer side effects. Other analogues, not yet widely available commercially or still under study, may prove more effective with still fewer side effects. The new compounds include sulprostone (16-phenoxy-ω-tetranor-PGE_2 methylsulfonylamide), which has been tested extensively; ONO-802 (16,16-dimethyl-trans-Δ^2-PGE_1 methyl ester), now undergoing trials; and 9-deoxo-16,16-dimethyl-9-methylene-PGE_2, now in initial stages of clinical testing (see pp. 107-110).

Effectiveness

There are no large scale randomized studies specifically comparing the effectiveness of vacuum aspiration and PG abortion in the first trimester. Comparing individual clinical reports is difficult because of different definitions: some studies measure effectiveness in terms of the number of cases in which pregnancy did not continue, regardless of complications (150); other studies measure completeness, so that whenever a follow-up procedure is required — for example, to remove retained products of conception — the abortion is considered incomplete (57, 137). A recent US analysis of 65,000 procedures indicates that vacuum aspiration, the established practice for early pregnancy, is about 99 percent effective in interrupting pregnancy (150); rates of complete abortion, that is, the proportion of women not requiring further clinical procedures, range from 95 to 98 percent (57, 137).

With prostaglandins, two of the largest clinical studies to date showed that 15-methyl-$PGF_{2\alpha}$ methyl ester suppositories were effective in 91 or 100 percent of women, with complete abortion in 76 or 95 percent (173, 316) (see Table 4).

One small study in Sweden compared vacuum aspiration and PG suppositories of the unstable analogue 16,16-dimethyl-PGE_2 (303). In 78 women five to eight weeks after the last menstrual period, the rates of complete abortion were 93 percent for the PG and 95 percent for vacuum aspiration — not significantly different. Bleeding lasted an average of 11.9 days after the PG and 9.3 days after vacuum aspiration. As expected, the side effects of vomiting, diarrhea, and pain all occurred among the PG subjects only, but none took medication to prevent gastrointestinal reactions. All in the vacuum aspiration group were given sedation and paracervical anesthesia to control pain and possible vasovagal shock due to mechanical cervical dilatation, while 30 percent of the PG group took intramuscular analgesics for uterine cramps (303).

Vaginal Suppositories

The World Health Organization has sponsored international trials of vaginal suppositories containing 15-methyl-$PGF_{2\alpha}$ methyl ester. In studies of 1.0 and 1.5 mg suppositories of the $PGF_{2\alpha}$ derivative, repeated every three hours up to a total of four doses, four participating clinics reported effectiveness rates of 90 to 100 percent (69, 154, 156) (see Table 4). One center reported only 70 percent success with the 1.0 mg dose (156), and another, where women inserted the last three suppositories themselves, reported 65 percent and 70 percent effectiveness rates for the 1.0 and 1.5 mg doses, respectively (503). Subsequent, as yet unpublished studies may be able to improve on these initial results.

WHO trials have also tested suppositories of 16,16-dimethyl-PGE_2. With multiple doses, effectiveness rates have ranged from 82 to 100 percent (228, 312). The instability of the compound limits its practical application, however.

Table 4. First Trimester Abortion Induced by Prostaglandin Analogues, by Route of Administration and Analogue, Selected Recent Studies, 1976-1979

Author & Date	Ref. No.	No. of Women	Dosage	Gestation Length (in days LMP)	% Effective	(% Complete)	% Experiencing Side Effects (Episodes per Woman)			
							None	Vomiting	Diarrhea	Pain
Single vaginal suppository/15-methyl-PGF$_{2\alpha}$ methyl ester										
Dutt et al. 1979	134	17	3 mg	mean 45	94			94[a]		
Gréen et al. 1978	173	38 35 128	2 mg 2.5 mg 3 mg	≦ 49 ≦ 49 ≦ 49	100 97 100	(76) (86) (95)		37 32 54	32 51 59	
Kinra et al. 1978	243	58	3 mg	70-98	72			(0.8)	(1.4)	
Lauersen & Wilson 1979	274	18	3 mg	63-77	72					
MacKenzie et al. 1978	313	78	1 or 1.5 mg	mean 18	85		19	49	73	20
Mandelin 1978	316	104	3 mg	37-51	91	(76)	53	24	37(1.1)	66
Multiple vaginal suppositories/15-methyl-PGF$_{2\alpha}$ methyl ester										
Bygdeman et al. 1976	72	63	0.5-1.5 mg/3 hours × 3-4	31-49	100	(97)	42	—— 58 ——		
Fylling & Jerve 1977	154	30	1 or 1.5 mg/3 hours × up to 5	39-51	100			(3.0) (1.0)	(1.5) (2.5)	
Ganguli et al. 1978	156	20	1 mg/3 hours × up to 4	≦ 56	70			(0.2) (1.0)	(1.0) (1.1)	
Hamberger et al. 1978	186	42	1 or 1.5 mg/3 hours × 4	36-60		(93)				
MacKenzie et al. 1978	313	19	1 or 1.5 mg/3 hours	mean 22	95		21	63	53	53
Ylikorkala et al. 1976	500	40	1 or 1.5 mg/3 hours	41-55	98	(75)		40	65	
Zoremthangi et al. 1976	503	40	1 mg/3 hours 1.5 mg/3 hours	30-50	70 65	(68)		33	28	5
Multiple vaginal suppositories/16,16-dimethyl-PGE$_2$										
Karim & Ratnam 1977	228	12	750 μg/4 hours[b]	84-91	82			9	7	12
Lundström et al. 1977	303	50	.8, .8, 1, 1 mg at 3-hour intervals .8 mg × 4	35-56 35-56	NR NR	(87) (94)		13	14	26 36
MacKenzie et al. 1978	313	14 20	1 mg/6-8 hours × 2 1 mg/3 hours × 4	mean 20.2 mean 19.0	100 100		69 20	8 53	31 53	31 40
Intramuscular injection/15-methyl-PGF$_{2\alpha}$										
Fylling & Jerve 1977	154	24	600 μg single	30-60	92	(75)		(2)	(5)	
Seifert et al. 1978	395	19	250 μg/2 hours × 3-4	mean 45	90	(74)		32(1.8)[c]	32(1.8)	

NR = not reported

[a] Also, nausea: 65

[b] Researchers used the semicarbazone ester of 16,16-dimethyl-PGE$_2$.

[c] Also, nausea: 47(1.0)

Among single dose regimens of 15-methyl-PGF$_{2\alpha}$ methyl ester suppositories, a 3.0 mg dose has proved most effective. Success rates have ranged from near 70 to 100 percent (173, 243) (see Table 4). Plasma measurements show that in most women the concentrations of the analogue stayed at the therapeutic level of 1,200 pg/ml for three to six hours and remained above 900 pg/ml for 12 hours (173) (see Figure 3).

In suppository form, analogues of both PGE$_2$ and PGF$_{2\alpha}$ cause gastrointestinal side effects, but not as frequently as intramuscular and intravenous administration in other procedures. Side effects were lowest in a study by Karim using a single 750 μg dose of the p-benzaldehyde semicarbazone ester of the PGE$_2$ analogue; of 512 women studied, 9 percent experienced vomiting, 7 percent had diarrhea, and 4 percent had fever (228). PGE derivatives characteristically evoke fewer gastrointestinal side effects than PGF$_{2\alpha}$ derivatives, although aberrations in body temperature, such as chills, fever, and flushing, are more common (126). Unfortunately, PGE derivatives made up into suppositories are unstable unless they are kept deep frozen and used within a short time, a disadvantage for use outside of metropolitan facilities.

In a small study, a graduated, two-dose suppository regimen is showing better results than the single 3 mg suppository, with more even plasma PG levels. Niels Lauersen reported that, after inserting a 1 mg 15-methyl-PGF$_{2\alpha}$ methyl ester suppository, and another 3 mg suppository three hours later, all 19 women aborted successfully, defined as a negative pregnancy test and no need for uterine evacuation. They were compared with 20 women given only a 3 mg suppository, of whom 75 percent aborted successfully. Those using the two-dose regimen had an earlier onset of uterine activity and slightly fewer side effects than did women starting with 3 mg (260).

Intramuscular Injections

Intramuscular injections of 15-methyl-PGF$_{2\alpha}$ (tromethamine salt) for first trimester abortion yield high effectiveness rates, similar to those obtained with suppositories, but side effects have been unacceptably high with the doses used to date. Unlike the native PGF$_{2\alpha}$, its 15-methyl analogue can be injected intramuscularly without causing local inflammation and pain (63). The rapid absorption and high PG levels in blood plasma that result, however, produce vomiting and diarrhea for about an hour after each dose (172). A trial using three to four 250 μg doses of 15-methyl-PGF$_{2\alpha}$ at two-hour intervals and another using a single dose of 600 μg both yielded effectiveness rates of about 90 percent and completion rates of about 75 percent, with bleeding starting about 3.5 hours after initial treatment (154, 395) (see Table 4).

Despite frequent side effects, intramuscular injections have three important advantages over vaginal application: (1) they can be used in much lower doses; (2) they are absorbed at a more consistent and predictable rate; and (3) injections are the most acceptable form of medication in many countries (358). Therefore, research is continuing with sulprostone and other new PG derivatives to improve this approach.

Mode of Action

PGs appear to induce abortion in the first trimester primarily through uterine contractions. These are probably stimulated both directly by the exogenous PGs and indirectly by enhanced release of endogenous PG (114, 174). Uterine activity recordings showed that the first response to a 3 mg suppository of 15-methyl-PGF$_{2\alpha}$ methyl ester was an increase in uterine muscle tone lasting about four hours, followed gradually by regular contractions (114, 262). In another study, ultrasonic scanning revealed that, about four hours after administration of a single 3 mg suppository, the conceptus was physically dislodged from the uterine wall; the rest of the uterine contents were expelled in three to nine days (134).

Plasma progesterone levels fall gradually after PG administration. The progesterone level registers a statistically significant decline in four to six hours (72, 114, 115), reaches 30 to 50 percent of the initial level in 24 hours, and by the end of one week falls to 10 percent of the initial level (see "Luteolysis," p. G-83). Although controversy remains, many researchers think that this decline is the result of uterine contractions, not the cause of them. The initial decline in progesterone presumably results from disruption of the developing placenta, which, along with the corpus luteum, secretes progesterone to maintain pregnancy. Alternatively, according to the "progesterone withdrawal" theory of Arpad I. Csapo, it is this decline in progesterone in the uterine smooth muscle that facilitates the development of regular uterine contractions after initial sustained (tetanic) contraction evoked by exogenous PG (114, 115). Some abortions take place without an appreciable drop in progesterone levels, however (72). This would seem to contradict the progesterone withdrawal theory, but the persistence of progesterone in the circulation makes it difficult to interpret the exact role of progesterone in regulating uterine contractions.

Clinical Events

With prostaglandins in early first trimester abortions, sometimes called menstrual regulation or MR (performed up to seven weeks after the last menstrual period), uterine cramping, although occasionally more severe, is usually similar to normal menstrual cramping (242, 500). Gastrointestinal side effects are common, however. While these side effects might be the major impediment to acceptance of PG suppositories for first trimester use, in one study Swedish women who used suppositories were more satisfied with the procedure than women who underwent vacuum aspiration procedures (372).

Uterine cramping or pain begins within 15 minutes to three hours. The onset is quick with intramuscular injection, slower with suppositories. In clinical trials about one-third of participants have asked for analgesic injections to ease pain (see Table 4). Women who have had dysmenorrhea do not appear to experience more severe pain than those who have not (303).

Bleeding begins in about 30 minutes to eight hours. The amount of blood loss is slightly greater than that lost in normal menstruation. One study reported a range of blood loss in the first 24 hours, measured by collection, from about 28 ml in nulliparas to 63 ml in women with two or more children and, subsequently, measured by standard extraction methods (184), 74 ml in both groups (186). Bleeding usually lasts 10 to 12 days, about 2 days longer than following vacuum aspiration abortions (304). Hemoglobin levels, measured within a week or two after the procedure, had fallen slightly in a few women, but not significantly (173, 303, 316). In the next menstrual period, blood loss is usually greater than normal. In one study 45 percent of women lost at least 60 ml, which was considered the upper limit for normal menstrual fluid volume (186).

Bleeding patterns in cases where the woman is not pregnant or where the abortion is incomplete may differ from those seen in cases of complete abortion. If the woman is not pregnant, she will bleed briefly or slightly for a few days, then have a normal menstrual period on schedule or a few days later (69, 242). Prolonged or excessive bleeding may indicate infection or incomplete abortion. Ultrasonic scanning has shown that small bits of conceptual tissue may remain in many women; this is without clinical import, however (134). Early in the first trimester evacuation of the uterus takes place over several days, and expulsion of conceptual tissue cannot be detected by an ordinary clinical exam.

The **gastrointestinal side effects** of PGs — nausea, vomiting, and diarrhea — may occur immediately and transiently after injections or more gradually and persistently with slow-release media; the timing of side effects is determined by PG levels in plasma (see Figure 4). Side effects are alleviated somewhat by premedication (296) and/or concurrent medication given either routinely or at the woman's request. Prochlorperazine (Compazine) is routinely used as an antiemetic, and a diphenoxylate and atropine combination tablet (Lomotil, Retardin), as an antidiarrheal. Analgesics have been administered either orally, rectally, or intramuscularly. In clinical trials, with treatment for side effects, about one-third experience vomiting; one-half, diarrhea (see Table 4).

Vaginal Devices

The analogue 15-methyl-PGF$_{2\alpha}$ methyl ester has been incorporated into slow-release vaginal devices made of Silastic 382, a silicone rubber polymer, in an attempt to develop a mode of administration superior to suppositories. The devices were intended to reduce individual variations in absorption and to eliminate the multiple insertions required with suppositories. In addition, unlike suppositories, the devices remained intact at high ambient temperatures and could be retrieved if a woman reacted severely to PGs. These devices were used for second as well as first trimester abortion.

To date the vaginal devices have not lived up to expectations, however. Several researchers report that 20 to 60 percent of women expelled the devices, often unnoticed (192, 370). One clinic managed this problem by inserting a vaginal tampon or a diaphragm after the device (272). In some of the first devices, prostaglandin apparently crystallized on the surface of the device, causing erratic variations in drug absorption among individuals (410).

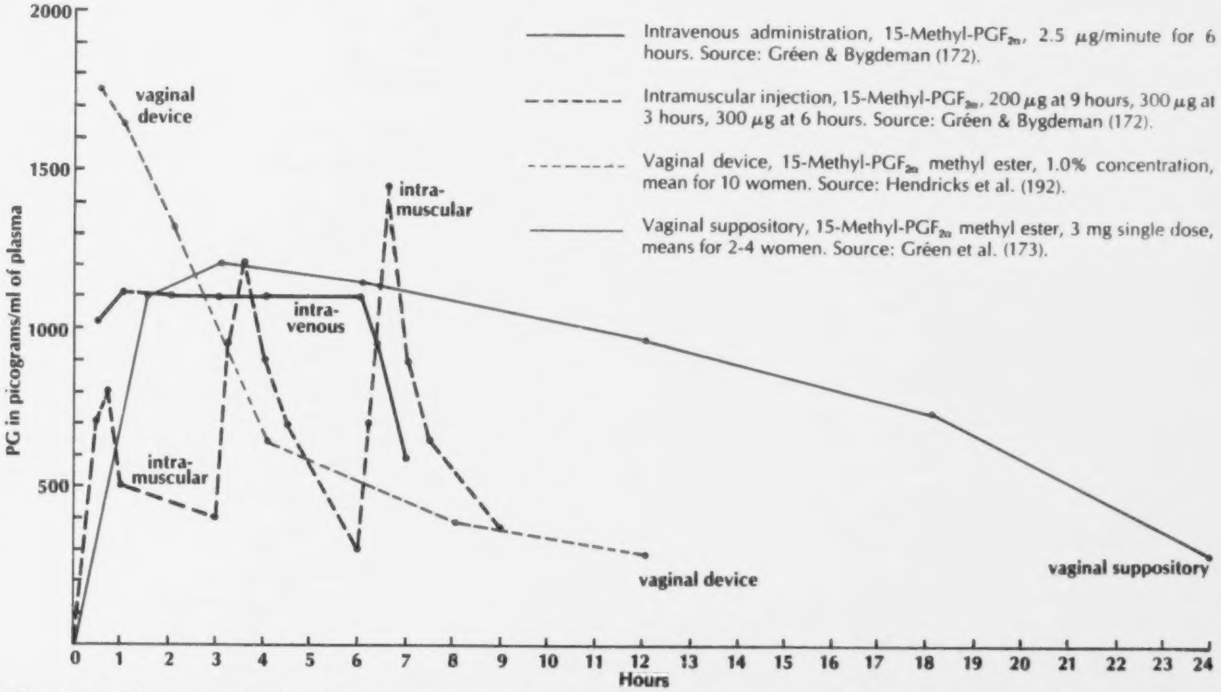
When the devices did stay in place and did release PGs at the appropriate rate, the more successful devices proved almost as effective as suppositories for both first and second trimester abortion. Drug absorption and therefore effectiveness appeared to depend on the concentration and the surface area of the device more than on the total drug content in the device (409). Overall success rates in the early first trimester ranged from 68 percent with a 0.2 percent concentration to 100 percent with a 0.5 percent concentration (see Table 5). In the second trimester, success rates ranged from 60 to 96.3 percent. The highest success rates have been achieved with the highest concentration studied — 1.0 percent (see Table 5). Even with the same devices, however, results have varied considerably (261).

Rates of vomiting and diarrhea have also varied, affecting anywhere from nearly all women in two small trials where they were not premedicated (192, 438) to less than half in trials with low-dose devices (see Table 5). In contrast with women given intramuscular injections, women with devices who were premedicated against vomiting and diarrhea could get along with concurrent medication only as needed instead of routinely (261). Occasional transient fever, flushing, or chills were reported (41, 69, 192, 370, 409, 438).

Cervical Dilatation

An alternative to using PGs to induce abortion in the first trimester is using them to dilate the cervix before vacuum aspiration. The intent of this "priming" of the cervix with PGs is to avoid pain and potential injuries from rapid mechanical dilatation. Women pretreated with PGs lose 30 to 50 percent less blood during vacuum aspiration than women not receiving PGs (155, 252, 266), and, according to initial studies, the incidence of cervical injury is considerably less (43, 96, 127). Where some mechanical dilatation is still needed, it can be accomplished easily because the cervix is softened by the PG (127). The drawbacks of using PGs for cervical priming before vacuum aspiration are that it may require an additional visit to the clinic or doctor's office and can cause gastrointestinal side effects.

Figure 4. Representative Blood Plasma Levels of 15-Methyl-$PGF_{2\alpha}$ and 15-Methyl-$PGF_{2\alpha}$ Methyl Ester Administered by Various Routes



The pattern of blood plasma levels of prostaglandins depends upon the mode of administration. It affects both abortifacient efficacy and rates of gastrointestinal side effects and pain. For example, with intramuscular injections, side effects are most common and most severe around the time that plasma levels peak, about one-half hour after injection.

Table 5. Abortion Induced by Vaginal Devices Containing 15-Methyl-$PGF_{2\alpha}$ Methyl Ester, Summary of Selected Studies, 1976-1978

	Characteristics of Device					
Author, Date (Reference Numbers)	PG Concentration (%)	Surface Area (in cm^2)	PG Content (in mg)	Total No. of Women	Gestation (in weeks)	% Effective
First Trimester						
Brenner et al. 1977 (41), Corson & Bolognese 1977 (103), Robins 1977 (370)	0.2	5	3	19	7	68
Brenner et al. 1977 (41), Bygdeman et al. 1976 (69), Corson & Bolognese 1977 (103), Robins 1977 (370), Thomas et al. 1978 (438)	0.5	10	5	43	9	89
Bygdeman et al. 1976 (69), Robins 1977 (370)	0.5	NR	10	24	9	100
Late First and Second Trimester						
Lauersen & Wilson 1976 (268)	0.25	20	5	10	8-14	60
Lauersen & Wilson 1977 (270)	0.5	10	5	20	12-20	54[b]
	0.5	10	5	28	12-20	95[b]
Lauersen & Wilson 1976 (268)	0.5	40	5	10	8-14	90
Bygdeman et al. 1976 (69)	0.5	NR	10	10	10-12	90
Dillon et al. 1976 (125), Lauersen & Wilson 1977 (267), Lauersen & Wilson 1976 (269), Lauersen & Wilson 1976 (272)	0.5	20	11	106	6-24	83
Bygdeman et al. 1976 (69), Dillon et al. 1976 (125), Hendricks et al. 1976 (192), Lauersen & Wilson 1976 (268)	1.0	20	11	54	8-20	96

NR = not reported

[a] Weighted averaged computed by dividing the total number of successful abortions in all studies listed by the total number of women involved in those studies.
[b] These two results were obtained with two shipments of devices in the same trial.

PG analogues, rather than natural PGs, have been the focus of research on cervical dilatation before vacuum aspiration. Various regimens have proved helpful. In one study, a single suppository of 2.0 mg of 15-methyl-$PGF_{2\alpha}$ methyl ester dilated the cervix to a mean 9 mm in six hours, while a 2.5 mg suppository in a slower-releasing base dilated the cervix to a mean 11 mm in 12 hours (155). In another study, a single suppository of 1 mg dilated the cervix to a mean 9.4 mm in 12 hours (266). (The cannulas commonly used in first trimester vacuum aspiration procedures are 6 to 12 mm in diameter, depending on the length of gestation.) In four separate trials, suppositories of 1.0 to 1.5 mg of 15-methyl-$PGF_{2\alpha}$ administered in four doses at three-hour intervals dilated the cervix at least 9 mm in all women (210) or at least 10 mm in 80 to 100 percent (95, 252, 504). Injection into the cervical tissue at two sites of 50 μg of 15-methyl-$PGF_{2\alpha}$ methyl ester has been studied but judged less effective than vaginal administration. Some 62.5 percent of cervices dilated to 10 mm or more within four hours (252).

With suppositories, gastrointestinal side effects and uterine cramping have ranged from what investigators termed "occasional" (155) or "tolerable" (266) to vomiting or diarrhea in 53 percent of women who were not premedicated (95).

The primary $PGF_{2\alpha}$, deposited in the endocervical canal in a viscous gel, has produced satisfactory dilation of the cervix. In one study, a 3 or 5 mg dose produced mean dilation of 12.5 mm after 8 to 12 hours (255). In another, a 3 mg dose dilated the cervix to a mean 14.3 mm in 10 to 12 hours (247). In this study, despite premedication, 70 percent reported pain and 36 percent vomited. The researchers who first used PGE_2 gel deposited endocervically before labor induction have now tested a very low dose of PGE_2 gel applied before evacuation at 10 to 12 weeks gestation. They used 0.5 mg PGE_2 to dilate 11 women from a mean of 5.4 to a mean of 10.7 mm in 12 hours. Cervical consistency scores increased significantly, an added advantage of PG priming over mechanical dilatation. The women felt no side effects except painful uterine contractions in 2 of 19 cases (523).

Newer PG derivatives produce the desired cervical dilation more quickly and with fewer side effects. Sulprostone has been the subject of several studies on cervical priming (288, 376, 454, 476). Single 500 μg intramuscular doses yielded dilation of 10 mm or more for 72 percent of 93 women in four hours and for 97 percent in 12 hours (454). In two studies, injections of sulprostone into the cervical tissue resulted in dilation of 10 mm or more in almost all women (454, 476). In nonpregnant women undergoing hysteroscopy or other diagnostic procedures, however, sulprostone produced dilation of only 5 to 7 mm (300). A 500 μg vaginal suppository of 16,16-dimethyl-PGE_2-p-benzaldehyde-semicarbazone ester produced a mean 8 mm dilation in five hours. Women in this study, who took oral analgesics beforehand, reported no pain; of the 124 women studied, only one vomited and one suffered diarrhea (222).

In some women, PGs administered to dilate the cervix bring on abortion before the scheduled vacuum aspiration procedure. With 15-methyl-$PGF_{2\alpha}$ methyl ester suppositories, the proportion aborting before aspiration has ranged from 20 to 70 percent (95, 210, 266, 504); with $PGF_{2\alpha}$, the proportion was 29 percent in one study (247); with sulprostone, about 50 percent in two studies (288, 376).

Because of higher rates of incomplete abortion, gastrointestinal side effects, uterine pain, and somewhat more bleeding, prostaglandins currently available do not appear superior to vacuum aspiration for first trimester abortion. Yet vacuum aspiration, especially when it is not performed by skilled operators, also poses dangers — including traumatic mechanical dilatation of the cervix, reactions to anesthetic, perforation of the uterus, and (in rare cases) breaking the tip of the cannula. Also, the efficacy of vacuum abortion is somewhat lower before the eighth week of pregnancy than after (136, 150), whereas for PGs the reverse may be true (67) (see Table 4).

From a broader, less clinical perspective, PGs may eventually offer advantages in both cost and personal privacy over a method like vacuum aspiration, which requires surgical intervention. In the US, where abortion is legal and where facilities for vacuum aspiration are widely available, women seem to perfer a rapid, highly effective surgical procedure, whereas women in Europe and in developing areas might make greater use of a nonsurgical approach which can be used privately with relatively little hazard even though the process takes longer and involves greater discomfort. Since prostaglandins have now been proved relatively safe and effective for terminating early pregnancy, other factors — for example, the attitudes of women, the costs, the legal status, and the availability of various PG formulations and alternative procedures — may make more difference in determining the eventual use of these compounds than further clinical trials.

SECOND TRIMESTER ABORTION

Research on and use of PGs for second trimester abortion have grown substantially in recent years. $PGF_{2\alpha}$, either alone or in combination with other compounds, is now widely used as an intraamniotic agent in many developed countries. Large-scale collaborative studies show that $PGF_{2\alpha}$ induces abortion faster than hypertonic saline and, in most trials, more effectively, but, because of a larger number of incomplete abortions, it appears to have a higher complication rate. For early second trimester abortions — from the 12th through the 16th week — analyses by the US Center for Disease Control suggest that dilatation and evacuation (D&E) may be safer and more acceptable than either PGs or saline. Meanwhile, the $PGF_{2\alpha}$ analogue 15-methyl-$PGF_{2\alpha}$ was approved in 1979 in the US and India and is being tested internationally.

The advantages and disadvantages of PGs compared with other second trimester procedures are now being vigorously debated. The reasons are obvious. Second trimester abortion is legally and medically controversial. Between the 12th and the 24th week of pregnancy, the fetus develops rapidly in size. Fetuses aborted by instillation procedures late in the second trimester may in a few instances survive briefly outside the uterus. In the US, this has raised legal problems with respect to the responsibility of the physician and the institution for trying to maintain the life of the fetus (279, 369). From a medical standpoint, the health risks of abortion to the woman increase proportionately as pregnancy advances, although until the 24th week the health risks of abortion are less than those of live birth (88). From the 12th to 16th weeks, the 16th to 20th weeks, and after the 20th week, different techniques and instrumentation, each with particular benefits and risks, may be preferable both for the woman seeking abortion and for the abortion provider. To establish beyond doubt the safest and most acceptable procedure at each of these intervals will require controlled, randomized international trials, as well as continued observational and analytical comparisons (37, 82, 511).

Intraamniotic $PGF_{2\alpha}$

Since the US Food and Drug Administration (USFDA) in November 1973 approved its use, intraamniotic instillation of $PGF_{2\alpha}$ has been increasingly employed as a substitute for hypertonic saline instillation in second trimester abortions. It is now registered in 24 countries in Europe, West Africa, and the Americas, and also in Australia (10). In the US, in 1977 about 17 percent of reported second trimester abortions and 25 percent of those performed between 16 to 20 weeks were induced with intraamniotic $PGF_{2\alpha}$ (456). Debate about the relative safety of second trimester methods and concern about legal issues have slowed the shift to PGs, and some US centers reportedly have returned to the use of saline, which is toxic to the fetus, or have begun to use PGs in combination with other techniques such as urea (440).

The standard dose of intraamniotic $PGF_{2\alpha}$ is 40 or 50 mg, supplemented if necessary with an additional 10 to 40 mg 24 hours later or with another oxytocic (uterine stimulant) such as intravenous oxytocin or intramuscular 15-methyl $PGF_{2\alpha}$. With this regimen, studies show, abortion ensues in 88 percent (430) to 100 percent (279) of women, with complete abortion in 49 percent (430) to 84 percent (368). With $PGF_{2\alpha}$ the mean abortion interval is 20 to 25 hours (16, 430, 491), compared with about 30 to 35 hours with saline (17, 491). (See Table 6).

Relative Safety Debated

Some consider the rapid clinical acceptance of intraamniotic $PGF_{2\alpha}$ to be premature. Several recent, large-scale comparative trials in the US and elsewhere show that rates of major complications, most notably bleeding due to incomplete abortion, are higher with PGs than with saline (see Table 6). Two smaller, as yet unpublished studies show that complication rates with PGs also are higher than with D&E (178, 424). Because mortality is low with any form of legal abortion, differences in mortality among these methods are less valid statistically than differences in complications, which occur more often.

Because $PGF_{2\alpha}$ is a naturally metabolized, endogenous substance, it has been considered theoretically safer than saline, which can adversely affect the circulatory system in various ways. Most major comparative studies belie this theoretical argument, however. Three of four have found that $PGF_{2\alpha}$ causes more complications than saline.

- A prospective study by the Joint Program for the Study of Abortion (JPSA), working with the US Center for Disease Control, comparing 1,241 $PGF_{2\alpha}$ abortions with 10,013 saline procedures performed between 1971 and 1975, found PGs associated with higher rates of endometritis, fever for one day or more, hemorrhage, convulsion, and surgery to manage complications. The risk ratio, or relative risk, of all serious complications (the ratio of those with complications to those without complications among the PG patients divided by the equivalent ratio among the saline patients) was 1.6 for $PGF_{2\alpha}$, or 60 percent higher. For the specific complications noted, the risk ratio for endometritis was 1.4; fever, 2.2; hemorrhage, 3.1; convulsion, 4.0; and surgical evacuation, 1.3 (181).
- In the World Health Organization Prostaglandin Task Force Collaborative Study, involving 717 women aborted by $PGF_{2\alpha}$ and 796 by saline (491), relative risks of PGs, as calculated by JPSA/CDC researchers, were frequently similar to those of the JPSA/CDC study: bleeding, 3.0; bleeding requiring transfusion, 4.1; and complications requiring surgery, 1.3 (84).
- The Indian Council on Medical Research Study on Sequelae of Induced Abortion found significantly more hemorrhage, immediate major and minor complications, infection, and late minor complications with PGs than with saline (430). Other Indian reports are mixed. One study found fever, convulsions, infection, and cervical trauma more common with PGs (159), and one reported significantly more gastrointestinal side effects and bleeding (28), but a third found more infection and hemorrhage requiring transfusion with saline (124).
- By contrast with these reports, comparative studies by the International Fertility Research Program compared 314 saline abortions, 274 abortions induced by repeated doses of $PGF_{2\alpha}$, and 328 induced by single doses of $PGF_{2\alpha}$ and found higher rates of hemorrhage requiring transfusion, more fever, and more infections associated with salines. PGs, however, produced higher rates of cervical injury, bronchospasm, and convulsions. Overall, excluding PG-related vomiting and diarrhea, saline produced more complications (42).

Table 6. Second Trimester Abortion Induced by Intraamniotic $PGF_{2\alpha}$ or by Hypertonic Saline, Selected Comparative Studies, 1973-1978

Author & Date	Ref. No.	Type of Study	Agent	Dosage	No. of Women	% Effective (% Complete)	Mean Hours Induction to Delivery	Significant[a] Differences in Side Effects, Complications, & Treatment for $PGF_{2\alpha}$
Berger & Edelman 1977	17	Retrospective	$PGF_{2\alpha}$	40 mg	100	100 (49)	25[b]	Less fever
			Saline	40 g	100	96 (61)	35[b]	
Bostofte et al. 1975	38	Prospective, nonrandomized	$PGF_{2\alpha}$	25 mg	25	92	37	NS
			Saline	≦ 40 g	25	72	46	
Corson et al. 1973	106	Retrospective	$PGF_{2\alpha}$	20 mg with serial increments	10	100 (60)	26	
			$PGF_{2\alpha}$	30 mg + 25 mg	10	70 (60)	25	
			$PGF_{2\alpha}$	30 mg with serial increments	40	98 (70)	21	
			$PGF_{2\alpha}$	40 mg + 40 mg	20	100 (55)	21	
			$PGF_{2\alpha}$	40 mg with serial increments	20	95 (70)	18	
			Saline	23-47 g	40	93	34	
Edelman et al. 1976	138	Multicenter, prospective, randomized	$PGF_{2\alpha}$	50 mg	128	93 (55)	20[b]	More gastrointestinal side effects, less fever
			$PGF_{2\alpha}$	25 mg with serial increments	114	98 (63)	17[b]	
			Saline	40 g	130	99 (73)	26[b]	
Grimes et al. 1977	181	Multicenter, prospective, nonrandomized	$PGF_{2\alpha}$	various	1,241	92 (56)	25	More fever, endometritis, hemorrhage, convulsions, antibiotic administration, major and minor operative treatments of complications, readmission to hospital
			Saline	usually 40 g	10,013	98 (60)	29	
Lauersen et al. 1974	276	Prospective, nonrandomized	$PGF_{2\alpha}$	20 mg with serial increments	10	90 (70)	15	
			Saline	40 g + oxytocin	10	100 (90)	20	

(continued on next page)

In a recent comparison of the efficacy and safety of intraamniotic $PGF_{2\alpha}$ and hypertonic saline for second trimester abortion, David Grimes and Willard Cates, Jr., of the CDC reviewed 15 different studies of these procedures and concluded that the superiority of $PGF_{2\alpha}$ over saline — the two most commonly used instillation agents in the United States today — has not been established (175).

There are several reasons for continuing questions over the relative safety of the two procedures:

(1) saline is an established procedure with which physicians have considerable experience, whereas prostaglandins were experimental for much of the period of which data are available; changes are still being made in PG formulations, dosages, and administration schedules.

(2) Although the more serious complications of saline have been rare in the reporting centers, when they do occur they are difficult to manage even in the best equipped facilities. They include hypernatremia (an excess of sodium in the blood); a decline in blood clotting factors (hypofibrinogenemia, or consumptive coagulopathy), which frequently occurs to a subclinical degree but on rare occasions can lead to hemorrhage, kidney failure, or death; and destruction of the uterine wall if the solution is injected there rather than intraamniotically.

(3) Because of these potential complications, saline is contraindicated for high risk women (for example, those with renal or heart disease), and the use of prostaglandins instead for these women could be expected to be accompanied by a higher incidence of complications.

(4) As experience is gained with specific complications of prostaglandin use, practitioners are finding ways to minimize them.

One reason, for example, that $PGF_{2\alpha}$ seems to produce higher complication rates is that it yields incomplete abortion more frequently than does saline. The consequences of incomplete abortion can be bleeding, infection, repeat hospitalization, and surgical evacuation of the uterus. Timely handling of delivery of the placenta may be able to reduce these complications. The Indian Collaborative Study has shown significantly more bleeding complications when the placenta is left in place for 30 minutes or longer (489).

Other specific PG complications can also be reduced or treated. For instance, transverse cervical laceration, thought to

Table 6. (Continued)

Author & Date	Ref. No.	Type of Study	Agent	Dosage	No. of Women	% Effective (% Complete)	Mean Hours Induction to Delivery	Significant[a] Differences in Side Effects, Complications, & Treatment for $PGF_{2\alpha}$
Nielsen et al. 1975	335	Prospective, randomized	$PGF_{2\alpha}$	40 mg + oxytocin	16	100	14	
			Saline	15-30 g + oxytocin	16	69	22	
Ragab & Edelman 1976	363	Prospective, randomized	$PGF_{2\alpha}$	50 mg	50	98 (42)	22[b]	More vomiting, diarrhea, pain (50 mg dose only); less nausea alone, chills/flushing
			$PGF_{2\alpha}$	25 mg with serial increments	50	98 (74)	20[b]	
			Saline	40 g	50	98 (57)	26[b]	
Risk et al. 1975	368	Retrospective	$PGF_{2\alpha}$	various	37	100 (84)		NS
			Saline	30-50 g	570	97 (88)		
Robins 1978	369	Retrospective	$PGF_{2\alpha}$	40 mg + oxytocin + laminaria	700	99 (73)	17	NS
			Saline	40 g + oxytocin + laminaria	170	99 (89)	18	
Stroup 1977	422	Prospective, nonrandomized	$PGF_{2\alpha}$	40 mg + laminaria	100	99 (65)	17	Less fever
			Saline	40 mg + laminaria + calcium gluconate	22	100 (64)	18	
			Saline	40 g	24	96 (54)	30	
			Saline	40 g + laminaria	37	100 (70)	21	
World Health Organization 1976	491	Multicenter, prospective, randomized	$PGF_{2\alpha}$	25 mg + 25 mg	717	86 (57)	20	More hemorrhage, blood transfusion, surgical reevacuation, dyspnea, flushing, chest pain[c]
			Saline	40 g	796	81 (55)	30	

NS = no significant difference

[a] $P \leq 0.05$
[b] Median time
[c] As calculated by Cates et al. (84)

Source: adapted from Grimes & Cates (175) be more common in $PGF_{2\alpha}$ abortions than in saline abortions, is most likely in very young primigravid women whose PG abortions are augmented by oxytocin infusions (299). These injuries might be avoided by using laminaria or by omitting the oxytocin. Bleeding due to uterine atony (loss of muscle tone) probably can be prevented with intramuscular PG injections or continued oxytocin infusions (111, 238, 508). Transient fever without uterine tenderness, while not usually serious in itself, can create a clinical problem if it masks an actual infection and leads to misdiagnosis. Clinicians using PGs should remain alert to the possibility of infection with any fever even if the uterus is not tender.

Mortality statistics are as inconclusive as morbidity data (see Tables 7 and 8). In the US, the death-to-case rate for legal abortions using saline was about 16 per 100,000 procedures between 1972 and 1975; in 1976-1977, it fell to 3.5; the rate for prostaglandins and other agents has declined by about half in each two-year period for the last six years for which data are available — from 49.7 per 100,000 in 1972-1973 to 10.7 in 1976-1977 (82, 456). During the 16 to 20 week period, when more than three-quarters of 1972-1977 PG abortions were performed, the death-to-case ratio was 6.1 for instillation with PGs and other agents, 12.9 for D&E, and 19.3 for saline (456). Because the numbers are small — less than 50 second trimester deaths from all procedures between 1972 and 1977 — and the distribution of high-risk patients and early or late terminations may be shifting, these data are not conclusive. At least four of the six US women reported to have died following PG procedures before 1976 had serious preexisting conditions that contributed to their eventual deaths, and the deaths of the other two were at most tangentially related to PG administration (83). Since 1976, three or more deaths following PG procedures have been reported, two of otherwise healthy women due to cardiovascular collapse (87). The possibility that PGs may affect either the heart muscle or the circulatory system would warrant close attention if more such cases are reported (58, 87).

Indian studies have shown higher death rates associated with saline than PGs. In one case series, three of the five deaths among 507 saline patients were due to bleeding disorders or coagulopathy (124). Such disorders are apparently much more common in India than in the US, where they occur in only .3 percent of cases (175). Also, they are more serious in India because of the relative scarcity of sophisticated medical equipment (489). The other two deaths in this hospital series resulted from sepsis (124). In another series the four saline deaths among 1,152 cases were attributed to infection (123). The Indian Council of Medical Research reported one death in 507 women given saline and two in 1,295 given $PGF_{2\alpha}$ (430). In the Council's comparative study of $PGF_{2\alpha}$ and 15-methyl-$PGF_{2\alpha}$, three deaths occurred, one each in 430 given intraamniotic $PGF_{2\alpha}$, in 455 given intraamniotic 15-methyl-$PGF_{2\alpha}$, and in 1,569 given extraamniotic 15-methyl-$PGF_{2\alpha}$; all three deaths were due to hemorrhage (430). In summary, death-to-case rates in these series ranged from 197 to 986 per 100,000 for saline and from 122 to 154 per 100,000 for PGs.

While most of the early debate over relative safety focused on the two competing instillation procedures, PGs and saline, more recent data from the JPSA study suggest that D&E may be safer than either instillation method, at least between the 13th and the 16th weeks of pregnancy. Overall rates of hemorrhage and of retained products of conception were less than one percent with D&E, and only 9.9 deaths were reported per 100,000 cases (180). Moreover, the D&E procedure can be performed in less than an hour and causes no vomiting or diarrhea. It is usually done before 16 weeks gestation, when intraamniotic instillation is difficult. A comparison by Phillip Stubblefield of 406 D&E procedures up to the 16th week and 623 $PGF_{2\alpha}$ and laminaria procedures from 16 to 20 weeks produced no live fetuses and a significantly lower incidence of failed abortions, anemia, vomiting, diarrhea, pain, endometritis, and postdischarge bleeding with D&E than with PGs (424). In this study, as in the US aggregate data, the earlier gestation at which most D&E procedures are performed may help explain why its complication rate is lower, since complications increase in proportion to gestational age.

D&E, however, requires a skilled and experienced practitioner. Cervical injury is twice as frequent with D&E as with saline, and uterine perforation, six times as frequent (180). Also, local or general anesthesia, with its risks, is necessary. Further, dilating the cervix to as much as 14 mm, as required for D&E, somewhat increases subsequent risk of premature delivery (189, 490). This potential long-term complication may be mitigated by the use of laminaria or PGE_2 for cervical priming (523) as an adjunct to D&E, but this combined procedure will either require a second visit or a longer wait before the evacuation procedure.

Table 7. Deaths per 100,000 Legal Abortions, by Type of Procedure and Weeks of Gestation, United States, 1972-1977

Type of Procedure	Weeks of Gestation			
	13-15	16-20	21	Total
Prostaglandin or other instillation agents	32.6	6.1	40.5	10.8*
Saline instillation	2.5	19.3	20.6	15.5
D&E	6.7	12.9	16.7	8.3

Source: United States. Center for Disease Control (456).

Table 8. Deaths per 100,000 Legal Abortions, by Type of Procedure and Period, United States, 1972-1977

Type of Procedure	1972-1973	1974-1975	1976-1977	1972-1977 (95% confidence interval)
Prostaglandin	49.7	25.9	10.7	20.6* (9.4-37.5)
Saline instillation	16.9	16.0	3.5	15.5 (10.9-21.4)
D&E	4.8	8.6	10.2	8.3 (4.4-13.8)

Source: Cates et al. (86); US Center for Disease Control, in Benditt (15).

*The difference in the death-to-case rates for PGs and other instillations 1972-1977 in Tables 7 and 8 is caused by different estimates of the number of PG abortions performed, especially during 1972 and 1973 before PGs were licensed for US use. A total of 11 PG deaths occurred between 1972 and 1977 and this figure is the numerator for both rates. The denominator in Table 7 includes all abortions reported as "PG or other instillation agents" whereas the denominator used in Table 8 includes only procedures specifically identified as PGs.

Table 9. Second Trimester Abortion Induced by $PGF_{2\alpha}$ in Combination with Other Agents, Selected Studies, 1975-1978

Author & Date	Ref. No.	No. of Women	Inducing Agent(s) & Dosage	% Effective (% Complete)	Mean Hours Induction to Abortion (Nullip./Parous)	% Experiencing Side Effects	
						Vomiting	Diarrhea
Burkman et al. 1978	54	650	urea, 80 g + oxytocin, 32 mU/minute, intraamniotic	97 (59)	19.3	53	1
		1,083	above + $PGF_{2\alpha}$, 10 mg	98 (52)	15.1	73	5
Hodgson 1979	200	300	laminaria (1 to 11, mean 4.1, afternoon before) + $PGF_{2\alpha}$, 5 mg test dose staggered over 35 minutes, then 3.73 mg/hour by pump + oxytocin 167 mU/minute after 6-8 hours, continued for 2 hours after delivery	95 (93.7)	12.3	39	10
Kerenyi & Den 1979	239	508	amniocentesis of 50-400 ml + equal volume 20% saline replaced + $PGF_{2\alpha}$, 20 mg + oxytocin after contractions begin	99 (75)	16.1	33	0.8
Olund & Larsson 1978	340	23	Rivanol, 10 ml/week of gestation, 0.1% solution, extraamniotic	100	29.9	44	0
		23	above + $PGF_{2\alpha}$, 0.25 mg, then 0.75 mg/2 hours	100	24.9	39	0
Pahl & Lundy 1979	517	1,033	laminaria concurrently + $PGF_{2\alpha}$, 5 mg + saline, 50 ml, 20% solution + oxytocin after 24 hours	99 (67)	14.6	17	1.3
			above + laminaria the evening before		9.9		
Stubblefield et al. 1975	425	20	$PGF_{2\alpha}$, 40 mg, intraamniotic	67	29.4		
		243	above + laminaria for 14-18 hours	87	14.3		

For the woman seeking an abortion, a relatively quick procedure such as D&E under general anesthesia may be psychologically preferable to spending some 20 hours in discomfort and labor in order to expel a fetus vaginally. Nancy Kaltreider, Sadja Goldsmith, and Alan J. Margolis found that three weeks later women who had undergone prostaglandin abortions reported that they had experienced more pain than expected, were more depressed, had more guilt feelings, and were more likely to describe their experience as the loss of a baby than women undergoing D&E (216). The nurses also found the instillation procedure stressful. On the other hand, from the physician's point of view, D&E requires instrumentation of the pregnant uterus and fetal dismemberment and thus can also be disturbing (216).

These issues and others relating to second trimester abortion in the US were discussed at a 1979 conference in Chapel Hill, North Carolina (15, 82). Marc Bygdeman of the Karolinska Institute in Sweden was more optimistic about the prospects for PGs than US researchers. He subsequently pointed out that in the US, where outpatient clinics perform most early abortion procedures, D&E might be more suitable, but in Sweden and other countries where surgery is less frequent and most abortions are performed in hospitals, the preferred method might be different (15).

PGs With Other Techniques

The consensus of the Chapel Hill conference and the conclusion to be drawn from recent clinical research is that prostaglandins used in conjunction with other methods may be more effective and more acceptable than currently available PGs used alone (15, 424). T.D. Kerenyi, for example, one of the pioneers in the use of saline, has shifted from saline to a combination of urea and prostaglandins (238). PGs are now increasingly used with intraamniotic urea or extraamniotic Rivanol to hasten the evacuation process. At the same time, laminaria are also applied when appropriate to help dilate the cervix. (See Table 9.)

Urea is an alternative to saline as a hyperosmolar solution for midtrimester abortion by intraamniotic instillation. It was approved for this purpose by the USFDA in 1979. Urea is as effective as saline, and, like saline, toxic to the fetus, but, unlike saline, it is not toxic to the woman if misinjected. Mean abortion intervals are longer, ranging from 43.7 hours (364) to 51 hours (8) with urea alone or, combined with high doses of oxytocin, 18 hours (56) to 43.4 hours (477). The chief advantage of urea over saline is that theoretically the risk of serious complications is less because urea readily crosses cell membranes and so is easily eliminated from the body (250).

Low doses of PG added to the usual 80 mg dose of urea markedly shorten abortion intervals. The fetus may be expelled as early as 10.5 hours after instillation when 10 mg PGE_2 is the augmenting agent (109). $PGF_{2\alpha}$, however, is more convenient because it is more stable. Doses of $PGF_{2\alpha}$ from 2.5 mg to 20 mg have been tested, but PG dose has little effect on abortion interval. With high-dose oxytocin (332 mU/minute) given intravenously, Theodore King and Ronald Burkman at The Johns Hopkins University have reported mean abortion times ranging from 15.1 to 18.3 hours (54, 241). The shortest mean abortion intervals with urea plus $PGF_{2\alpha}$ were obtained with a 10 mg dose plus oxytocin: 15.1 hours (54) and 13.1 hours (479). With this low PG dose, there were few side effects, particularly little transverse cervical laceration and diarrhea (54). The dose was subsequently reduced to 5 mg (53). In two Indian studies comparing $PGF_{2\alpha}$ plus urea, 40 mg $PGF_{2\alpha}$ alone, and saline plus oxytocin, mean abortion time was shortest with $PGF_{2\alpha}$ plus urea in one (327) but with saline plus oxytocin in the other (290). In both studies, $PGF_{2\alpha}$ plus urea produced the lowest complication rates.

Rivanol (ethacridine lactate, or 6,9-diamino-2-oxyethyl acridine lactate) has been used extraamniotically for second trimester abortion in Japan for 20 years (314). There are said to be no contraindications or specific complications (254), although gastrointestinal side effects occur in about 30 percent of women (340). The method, which entails instilling 10 ml of a 0.1 percent solution for each gestational week, up to 150 ml maximum, takes an average of 28 to 30 hours to effect abortion, even with intravenous oxytocin as an augmenting agent (254, 340).

Pilot studies suggest that combining PGs with Rivanol may improve its effectiveness. Repeated, low extraamniotic doses of $PGF_{2\alpha}$ with Rivanol reduced mean abortion intervals by four to five hours in one study, but gastrointestinal side effects increased from about 30 to 50 percent (340). Augmenting Rivanol with two intramuscular injections of 15-methyl-$PGF_{2\alpha}$ cut mean abortion intervals down from 29.5 to 21.3 hours and boosted success rates from 78 to 88 percent, but the side effects were just as common as with systemic PGs alone (251, 366).

There is some evidence that Rivanol, like saline and urea, works by causing endogenous PG release. Indomethacin, an inhibitor of PG synthesis, prolongs Rivanol abortions (338); Rivanol increases lysozyme and free arachidonic acid content in amniotic fluid — both are indicators of PG activation (339, 341). More work with Rivanol, now in progress under the supervision of the WHO, may reveal another way to induce abortion with lower doses of PGs (489).

Laminaria are the dried and sterilized stems of the sea plant *Laminaria digitata*. Inserted into the cervical canal, they absorb moisture, swell, and slowly dilate the cervix (183). When laminaria are put in place several hours before PG administration, most conveniently the evening before, their use reduces abortion intervals by six to eight hours (26, 485) or more (425). Leaving the laminaria in place for only four hours proved slightly less effective (420). Inserting laminaria the evening before urea and PG instillation further shortens abortion intervals for this combined technique — a mean of 8.7 hours in one study, counting from the time of intraamniotic injection (485). In other studies, where oxytocin also was used, inserting laminaria at the time of instillation did not hasten fetal expulsion (420, 479).

ONO Pharmaceutical Company, Japan, markets oral tablets of PGE_2 in Japan, Korea, and Taiwan. (ONO)

15-Methyl-$PGF_{2\alpha}$ Analogue

The $PGF_{2\alpha}$ analogue 15-methyl-$PGF_{2\alpha}$, longer acting than the natural compound, is also being tested for use in second trimester abortion by a variety of routes of administration — intraamniotic, extraamniotic, intramuscular (in the tromethamine (tham) salt), and, in its methyl ester form, vaginal (see Table 10). Applied by the intraamniotic and vaginal routes, the analogue shows results comparable to those of $PGF_{2\alpha}$. Extraamniotic administration permits abortions between 13 and 16 weeks gestation but has a lower completion rate than other routes. Intramuscular injections produce severe gastrointestinal side effects. The analogue has been approved in 1979 in India for intramuscular, intraamniotic, and vaginal use between the 6th and 16th weeks (410) and in the US for intramuscular use in the second trimester.

Intraamniotic administration. Administered intraamniotically, a single injection of 2.5 mg of 15-methyl-$PGF_{2\alpha}$ (tham salt) is at least as effective as a 50 mg dose of $PGF_{2\alpha}$. Success rates are about 88 to 98 percent. In fact, in four comparative trials of 2.5 mg of 15-methyl-$PGF_{2\alpha}$ and 40 or 50 mg of $PGF_{2\alpha}$, the analogue proved more effective than the natural prostaglandin (397, 430, 494, 499). Abortions were complete in 46 to 77 percent of cases (19, 397, 430, 494, 499) — a range comparable to that for the parent compound. Mean abortion times — about 18 to 20 hours — were slightly shorter than with $PGF_{2\alpha}$ (19, 397, 430, 494, 499). Uterine pain and gastrointestinal side effects came on more gradually with the analogue than with $PGF_{2\alpha}$ (499), but gastrointestinal side effects as well as other, rare side effects such as shivering, dyspnea (breathing difficulties), and flushing were slightly more common, perhaps indicating sustained high plasma levels of PG. Acute bleeding was less common in one study (499). On balance, except for the possibility of using a single 2.5 mg injection, the analogue administered intraamniotically displays no distinct advantage over the native $PGF_{2\alpha}$.

Vaginal suppositories. In the form of suppositories, 15-methyl-$PGF_{2\alpha}$ methyl ester induces abortion more quickly than by intraamniotic instillation. Side effects are only slightly less frequent than with intramuscular injections, perhaps because plasma levels of PG remain at prolonged high levels, rather than form abrupt peaks. (Plasma levels after various modes of administration are shown in Figure 4, p. G-93.)

WHO tested 15-methyl-$PGF_{2\alpha}$ methyl ester suppositories in 310 women at seven locations worldwide. With repeated doses of 1.5 mg of triglyceride suppositories, 91 percent aborted within 30 hours. The mean interval was 13.1 hours for parous women and 15.3 hours for nulliparas. The women took antidiarrheal medication, but still 70 percent reported loose stools — an average of 2.8 episodes each among those affected — and 67 percent vomited — again 2.8 times each, on the average (495). The slightly less potent unesterified 15-methyl-$PGF_{2\alpha}$ (tham salt) has yielded similar effectiveness rates — 80 to 97 percent, but a longer mean abortion interval — 19 hours (27, 330, 468).

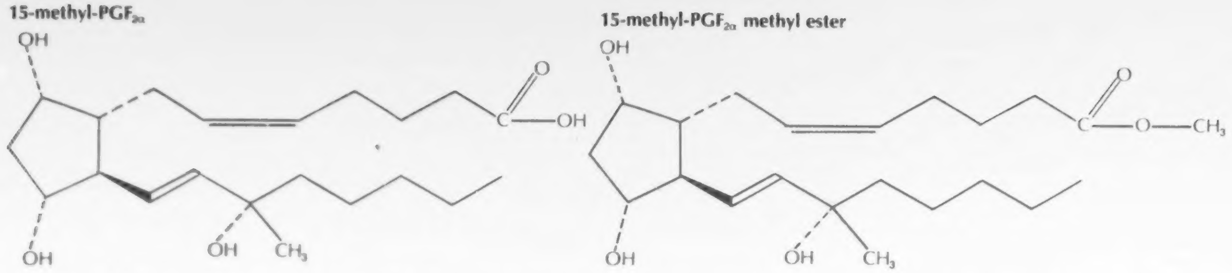

15-methyl-PGF$_{2\alpha}$
OH
O
C—OH
OH
OH
CH$_3$
15-methyl-PGF$_{2\alpha}$ methyl ester
OH
O
C—O—CH$_3$
OH
OH
CH$_3$

Figure 5. Both 15-methyl-PGF$_{2\alpha}$ and 15-methyl-PGF$_{2\alpha}$ methyl ester, analogues of the native PGF$_{2\alpha}$, have been tested extensively for induction of first and second trimester abortion and have been suggested for treatment of intrauterine death and to stop postpartum bleeding.

A single 3.0 mg suppository proved slightly less effective than repeated suppositories. The Indian Council on Medical Research, studying 288 women, reported abortion in 79 percent after 30 hours and 58 percent complete abortions. Vomiting and diarrhea occurred in three-fourths of the women, but other complications were few (431). In a Swedish study, 79 percent of 62 women aborted in an average of 13.3 hours, and all abortions were complete in 36 hours after an intramuscular injection of 15-methyl-PGF$_{2\alpha}$ (68); a trial in Finland achieved 78 percent effectiveness in 24 hours with a mean interval of 17.9 hours (317). By contrast, in a New Delhi study the suppositories were only 48 percent effective in 30 hours with a mean abortion interval of 15.4 hours in parous women and 20.7 hours in nulliparas (206).

With the 3.0 mg suppository, PG levels in plasma were detectable after two hours and averaged 200 to 400 pg/ml over 4 to 12 hours. By 24 hours they were undetectable. Cramps and side effects persisted as long as PG levels were measurable. Individual PG readings varied considerably, possibly because of inconsistent release by the suppositories or individual variation in vaginal absorption. The clinic investigating plasma levels found that all of the failed abortions in their studies involved suppositories from the same lot (11). Research to develop better suppository media to improve the performance of intravaginally administered PGs is continuing.

Vaginal devices containing 15-methyl-PGF$_{2\alpha}$ methyl ester also have been used for second trimester abortion. Success rates are similar to those of suppositories (see "Vaginal Devices," pp. G-92–93).

Extraamniotic administration. The advent of the long-acting 15-methyl derivative of PGF$_{2\alpha}$ makes it possible to induce abortion with a single extraamniotic dose of 1 mg or less. Several trials, including the WHO study of 660 women at 10 centers, showed that abortion intervals are relatively brief, averaging 13 to 17 hours (199, 254, 430, 493). Side effect rates are also relatively low, with vomiting and diarrhea reported in about one-third of the women. Effectiveness rates are disappointing, however. Only 77 to 90 percent of these women aborted

Table 10. Second Trimester Abortion Induced by 15-Methyl-PGF$_{2\alpha}$ or 15-Methyl-PGF$_{2\alpha}$ Methyl Ester, by Route of Administration, Selected Recent Studies, 1977-1979

Author & Date	Ref. No.	No. of Women	Dosage	% Effective (% Complete)[a]	Mean Hours Induction to Abortion (Nullip./Parous)	% Experiencing Side Effects	
						Vomiting	Diarrhea
Intraamniotic/15-methyl-PGF$_{2\alpha}$							
Tejuja et al. 1978	430	430	2.5 mg	88 (49)	20.6/17.7	42	24
World Health Organization 1977	494	919	2.5 mg	95 (52)	18-20	[b]	[b]
Extraamniotic/15-methyl-PGF$_{2\alpha}$							
Tejuja et al. 1978	430	1,569	1 mg	78 (23)	15.4/13.6	37	34
World Health Organization 1977	493	660	0.92 mg	80 (32)	16.2/13.1	38	32
Intramuscular injection/15-methyl-PGF$_{2\alpha}$							
Lange & Secher 1977	259	80	250 μg/2 hours	98	18.2/16.4	79	86
World Health Organization 1977	492	515	250 μg, then 300 μg/3 hours	85 (35)	15.7/13.7	[c]	[c]
Vaginal suppositories/15-methyl-PGF$_{2\alpha}$ methyl ester							
Tejuja et al. 1979	431	288	3 mg	79 (58)	14.7	72	77
World Health Organization 1977	495	310	1.5 mg/3 hours	92 (50)	15.3/13.1	67	70

[a] Effectiveness and completion rates differ among studies in part due to differing time limits and/or criteria.
[b] Episodes per woman: vomiting: 2.5; diarrhea: 1.1.
[c] Episodes per woman: vomiting: 2.9; diarrhea: 2.8.

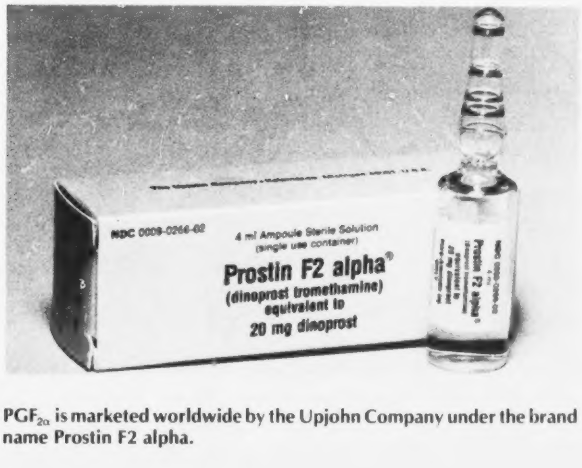
within 36 hours, perhaps because the uterine activity caused by the single PG dose began to subside too soon. The completion rate of 32 percent was the lowest of all the routes of administration examined by the WHO PG Task Force.

Intramuscular injection. The analogue 15-methyl-$PGF_{2\alpha}$, unlike the naturally occurring $PGF_{2\alpha}$, can be injected intramuscularly without causing severe pain or local inflammation. By this route, the $PGF_{2\alpha}$ analogue has induced midtrimester abortion in 85 percent or more women within 30 hours after they received 200 μg initially, then 300 μg repeated every three hours (492); in 90 percent or more given 250 μg every two hours (193, 259, 407); and in 95 percent given an individualized accelerated dose regimen (275). Because of systemic distribution and abrupt spikes in plasma PG levels, even with prophylactic medication, women averaged 5 to 11 episodes of vomiting and diarrhea in most studies (19, 158, 259, 407, 492) — so frequent that most investigators ruled out injections for routine use. In a review of 815 abortions by various dosages, most often 250 μg every two hours, 68 percent of the women vomited and 61 percent had diarrhea (392). One researcher remarked that his patients grew anxious anticipating the injections and subsequent side effects (193). Uterine pain seemed to be less with 15-methyl-$PGF_{2\alpha}$ than with $PGF_{2\alpha}$ (407, 492), and uterine bleeding was less because, unlike single-dose methods, intramuscular PG administration can be continued after membranes rupture to contract the uterus and decrease local blood flow (19).

Intramuscular injections can be useful to complete an abortion that failed after another type of procedure. Thus PGs can be an alternative to repeat intraamniotic injection, oxytocin infusion, or surgery. In one trial, the intramuscular approach proved effective in 92 percent of cases, producing complete abortions in an average of 5.3 hours and incomplete abortions in 11.9 hours (105). In another it proved effective in 100 percent within 3.8 or 5.8 hours in parous women and primiparas, respectively (271).

The 15-methyl derivative of PGE_2 in methyl ester form has also been tested intramuscularly and proved effective. It causes fever and chills more than gastrointestinal side effects (29, 265). Like most PGEs, this analogue is so unstable that it must be stored frozen and then refrigerated up to the time of use.

Although prostaglandins have proved faster than saline in effecting abortion, the long period of contractions, the high incidence of diarrhea and vomiting, the complications of incomplete abortion, bleeding, and fever, and the possibility of producing a live fetus have militated against wider use in the US. Between the 13th and 16th weeks, D&E, when performed by skilled practitioners, appears to be safe, more effective, and more acceptable to US women than prostaglandins. After the 16th week or under different conditions it is not yet possible to determine conclusively what the best procedure is. Research is underway, both with prostaglandins used in combination with other procedures such as instillation of urea and with new PG analogues, to minimize side effects and complications.



$PGF_{2\alpha}$ is marketed worldwide by the Upjohn Company under the brand name Prostin F2 alpha.

OTHER OBSTETRIC USES

In addition to inducing labor at term and abortions in the first and second trimester, PGs are used to induce labor in some cases of intrauterine fetal death and similar problems and to control postpartum bleeding. Intrauterine death in pregnancies of less than 18 or 20 weeks gestation is also called missed abortion and, in more advanced pregnancies, fetal death. Fetal death in utero before onset of labor occurred in about one percent of consecutive deliveries in two series (129, 447). PGs are also recommended for anencephaly (393) and as primary oxytocic agents in cases of hydatidiform mole (502).

Where death has occurred in utero, about 90 percent of the time labor will ensue naturally within three weeks (129, 447). Nevertheless, it is prudent to empty the uterus within a few weeks after death is diagnosed because of the psychological trauma for the woman as well as the risk of coagulation disorders which increase after the fetus has been retained for five weeks. After an intrauterine death, the blood clotting protein fibrinogen may gradually fall, increasing the risk of hemorrhage. In a series of 33 cases of fetal death, fibrinogen had declined linearly for several weeks in 30 percent and was below normal when first measured in 35 percent. Three women developed severe hemorrhage (360).

Prostaglandins can be both effective and safe in bringing on labor in cases of intrauterine death. Oxytocin even when infused for 12 to 24 hours is not always effective (42, 166, 289, 298, 463). Saline is more hazardous in these cases than PGs because the woman's tissue absorbs the solution more readily with a dead fetus in utero and because the risk of blood coagulation disorders is greater (42, 415). PGE_2 is more effective in managing cases of fetal death than in terminating intact second trimester pregnancies.

In a multicenter trial with 20 mg PGE_2 suppositories, 97 percent of 709 women with confirmed diagnosis of missed abortion or fetal death were delivered successfully in a mean 10.7 hours (411). The 11 women who were not delivered with PGE_2 alone (1.9 percent) had sufficient cervical dilation to allow uterine evacuation by other means. Operator experience was not a factor in the results. The side effects in these women, who were medicated only occasionally, were: vomiting, 56.4 percent; diarrhea, 42.7 percent; and transient fever, 40.2 percent. There were no cervical injuries. In addition to the short induction intervals and high success rates, vaginal suppositories for fetal death yield a high rate of complete as contrasted with incomplete abortion — 87 percent in the collaborative study. Thus, most patients do not require a surgical procedure.

Several small studies have explored other routes for administering PGs. One combined intramuscular 15-methyl-$PGF_{2\alpha}$ and laminaria to deliver six women with missed abortion (399). The laminaria were inserted the evening before, and antiemetics and antidiarrheal drugs were taken 2 and 10 hours before PG injections began. These women aborted in 4 to 24 hours, or an average of 9 hours, after two to four 250 mg injections. Medication limited gastrointestinal side effects to one to three episodes per woman (399). Another study, involving 11 cases of fetal death and 2 of anencephaly, reported an average induction interval of 7 hours, using intramuscular injections of 15-methyl-$PGF_{2\alpha}$ only (501). A lower dose of $PGF_{2\alpha}$, combined with urea and administered intraamniotically, induced labor in 20 women with an intrauterine death usually persisting two to three weeks and produced very few side effects (403). These women had 100 ml of amniotic fluid removed and replaced with 70 mg of urea in saline, 30 mg of $PGF_{2\alpha}$, and antibiotics. They averaged 13.2 hours until delivery, and among them suffered three incidents of nausea, two transient fevers, and two hemorrhages, one of which was due to a fibrinogen defect. In cases of prolonged fetal retention, however, intraamniotic instillation may be technically difficult, because much of the amniotic fluid has been resorbed, and risky because the placental membranes permit rapid absorption of PGs or hypertonic solutions.

PGs have also been used successfully in cases of hydatidiform mole (a benign cystic tumor derived from conceptual tissue) and anencephaly (a congenital defect where much of the brain is absent). Over 50 cases of molar pregnancy terminated with prostaglandins by various routes were reported in the literature up to 1975 (514). A further 27 cases were treated with 20 mg PGE_2 suppositories repeated at two to five-hour intervals. Eighty-five percent of these women were delivered in a mean 11.5 hours. They were all subsequently evacuated with suction and/or curettage. Side effects included vomiting in 63 percent, diarrhea in 30 percent, and fever in 22 percent. Bleeding over 500 ml occurred in 48 percent. One woman was found to have carcinoma and was treated with hysterectomy and chemotherapy (520). These studies found PGs the most convenient and effective means of evacuating molar pregnancies, although uterine curettage is necessary to insure complete removal of all potentially carcinogenic tissue.

Although the number of women with mole and anencephaly treated with various PG modalities is too small to permit conclusions, several practical points on management have emerged:

- So-called "PGE_2 reactions" — a combination of rapid breathing and heart rates, high fever, hypotension, vomiting, and diarrhea — have indicated that the 20 mg PGE_2 suppository may be too large a dose for some women, particularly in the third trimester (326, 353, 390). In fact, the PGE_2 suppository has not been authorized in the US for use in fetal death or hydatidiform mole past 28 weeks gestation (459). One possible solution has been to use a portion of a suppository, adjusting the dose to the individual (390).
- Blood coagulation monitoring is important in cases of intrauterine death so that low fibrinogen levels may be treated if necessary, even though this complication has been observed only rarely in recent studies (375, 403).
- If PG induction fails, one possible reason, even in the third trimester, is that the pregnancy is extrauterine (153, 346).

Postpartum Bleeding

Although there are few published articles on the subject, many US clinicians seem to be using 15-methyl-$PGF_{2\alpha}$ (tham salt) in the form of intramuscular injections to treat postpartum or postabortion bleeding due to uterine atony (111, 238, 508). Because postpartum hemorrhage is a common and potentially serious complication of delivery, oxytocic drugs are routinely given after delivery, thereby minimizing the risk of severe bleeding.

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Oxytocics such as PG injections also can prevent or reverse postabortion syndrome, a condition due to uterine atony. The syndrome can be characterized by severe pain, shock symptoms, and an enlarged uterus sometimes without severe bleeding (263, 380), and it can occur anywhere from immediately to several days after a uterine evacuation. As treatment, uterine aspiration is required along with the oxytocic (423).

The first use of $PGF_{2\alpha}$ to control bleeding was reported by Shigeo Takagi in Japan (521). He used $PGF_{2\alpha}$ intravenously and intramuscularly, at first with poor results. He then shifted to multiple injections directly into the myometrium, either transvaginally or transabdominally, with good results. He found $PGF_{2\alpha}$ equally effective in primiparas and multiparas, regardless of how much blood was lost before PG therapy began (521). The $PGF_{2\alpha}$ did not affect blood coagulation factors or injure the myometrium.

Because the 15-methyl-$PGF_{2\alpha}$ analogue is more specific and, injected intramuscularly, more convenient to use, it may be even more suitable for this use than natural $PGF_{2\alpha}$. Further clinical testing is warranted.

PG INHIBITORS

Primary dysmenorrhea is painful menstruation associated with ovulatory cycles. It typically begins soon after onset of menstrual cycles in young women and generally subsides after the first pregnancy. These women experience intermittent cramps and dull ache in the pelvic region; most may also suffer from nausea, vomiting, diarrhea, palpitations, dizziness, flushing, sweating, or headache — the same symptoms seen in women given exogenous PGs. Estimates of the incidence of dysmenorrhea range all the way from 3 to 90 percent of women (328, 482, 498), depending on whether one considers as diagnostic criteria a visit to an emergency room, absence from work or school, confinement to bed, use of analgesics, or simply loss of efficiency due to pain (20). Dysmenorrhea used to be considered one of the unavoidable burdens of being a woman, to be endured stoically, or taken as evidence that females were prone to psychosomatic illness. Now specific, effective drugs, PG synthesis inhibitors, are available to relieve much of the pain and other symptoms.

The chief cause of primary dysmenorrhea is now thought to be the prostaglandins that emanate from the endometrium shortly before and during menstruation. Three lines of argument implicate PGs in this process:

(1) dysmenorrheic symptoms are identical to side effects in women receiving high doses of PGs for abortion;

(2) PGF levels in the endometrium increase from proliferative through secretory to menstrual phase during ovulatory cycles and are higher than normal in the endometrium, endometrial jet washings, and menstrual fluid of dysmenorrheic women; and

(3) specific PG synthesis inhibitors reduce these high PG levels, normalize uterine activity, and relieve dysmenorrheic pain.

The exact process by which excessive PGs accumulate in the endometrium, reach the myometrium, and cause dysmenorrheic pain is unknown. PG levels may be abnormal because of greater synthetic enzyme activity (498), because of excess release of PG precursor acids (194), or because of a deficiency in PG metabolizing enzymes (257). Perhaps uterine pain receptors are sensitized to PGs or their biologically active endoperoxide precursors (498) or metabolites (305). Dysmenorrheic women are not more responsive than other women to intrauterine administration of PGs, however (301). Although the peripheral symptoms of dysmenorrhea resemble PG side effects, Vivecca Lundström has calculated that the plasma PGF metabolite levels are not high enough to produce the observed effects. Perhaps PGs released locally — for example, in the gastrointestinal tract — may be causing such symptoms as diarrhea (305).

Dysmenorrheic cramps arise both from uterine hyperactivity and from uterine ischemia, or deficient blood supply. Heightened uterine contractions, recorded as pressures of 200 to 300 mm Hg, are well documented in dysmenorrhea, compared with peak pressures of around 100 mm Hg in normal menstruation. The threshold for dysmenorrheic pain is considered to be 150 mm Hg. The basal tone, or resting pressure between contractions, is also usually above the normal level of

Table 11. Treatment of Primary Dysmenorrhea with Prostaglandin Synthesis Inhibitors, Selected Double-Blind Studies, 1974-1979

Author & Date	Ref. No.	Study Type	No. of Women	Dosage	Start of Treatment (Relative to first day of menses)	Assessment Criteria	% Experiencing Relief	Side Effects
ARYLACETIC ACIDS Alclofenac								
Boullaye et al. 1971	39	placebo crossover	48	500 mg 3 ×/day	Day 1	drug preference vs. placebo	56	1 fatigue 1 nausea
ARYL PROPIONIC ACIDS Anaprox								
Henzl & Izu 1979	194	placebo	227			pain relief, supplementary medication, daily activity	78	1%, nausea 1%, light-headed
Henzl et al. 1979	196	crossover	24	1,100 mg, single dose	*	pain intensity difference, uterine pressure	100	1 nausea
Ibuprofen								
Dingfelder & Staurovsky 1977	128	placebo crossover	48	400 mg/4 hours	Day 1	pain relief score, drug preference vs. aspirin or placebo, daily activity, supplementary medication, relief of associated symptoms	significantly better than aspirin or placebo	6%, acid stomach, nasal congestion, drowsiness
Layes Molla & Donald 1974	277	crossover	67	400 mg × 2	Day −1	drug preference vs. placebo, degree and duration of pain relief	64	6%
Ketoprofen								
Kauppila et al. 1979	235	crossover	23	500 mg 4×/day	Day −1	dysmenorrhea score, duration of associated symptoms, work absenteeism, blood loss	88	50%, gastrointestinal
Naproxen								
Dandenell et al. 1979	119	placebo crossover	97	250 mg up to 5/day	Day 1	pain, number of tablets, daily activity, menstrual flow	71	like placebo, but more flatulence
Kajanoja & Vesanto 1979	215	crossover	24	250 mg as needed	Day 1	pain, menstrual flow, number of capsules	61 moderate to good	21%, gastrointestinal
FENAMATES (anthranilic acids)								
Flufenamic acid								
Anderson et al. 1978	4	crossover	30	200 mg/8 hours	Day 1	dysmenorrhea symptoms, drug preference, number of capsules, number of supplementary medications, absenteeism	77	

*2-hour study of immediate relief

about 0 to 10 mm Hg. Moreover, contractions often occur at more frequent intervals in dysmenorrheic women. Probably the dull ache of menstrual pain is due to low blood supply in the uterus, since these pressures are well above systolic blood pressure and compress uterine blood vessels (498).

Newer analytical methods for measuring PGs in the myometrium throughout the menstrual cycle and in menstrual fluids have established even more definitively than did older techniques that PG levels are higher in dysmenorrheic women than in those who are not dysmenorrheic or in those who have been treated with PG inhibitors. Vernon R. Pickles and colleagues were the first to demonstrate elevated PG levels in dysmenorrheic subjects. They originally isolated a human "menstrual stimulant" and later showed that this was a mixture of PGE and PGF. In their classic study, bioassays of 4,950 menstrual "specimens" and endometrial curettings showed an excess of PGF over PGE in cases of dysmenorrhea (356).

In normal menstrual cycles, endometrial PGE content increases two- to threefold from proliferative to menstrual phase, and PGF content increases three- to fourfold (130, 405). Analysis by radioimmunoassay has shown that PGE and PGF concentration in dysmenorrheic endometria were three times higher at late secretory phase than in normal tissue (484), and determinations by gas-liquid chromatography-mass spectrometry have shown mean $PGF_{2\alpha}$ concentrations four times higher than normal in dysmenorrheic endometria on the first day of menstruation (305). Similarly, in women with dysmenorrhea the quantity of PGF released per cycle was twice as high as normal when bioassayed from tampon extracts (92), three times as high in concentration when radioimmunoassayed from cervical cup specimens (394), and five times as high per cycle when radioimmunoassayed in tampon extracts (502).

Over 40 clinical trials have demonstrated excellent results in treating primary dysmenorrhea with PG synthetase inhibitors. Trials record relief of dysmenorrhea in 60 to 100 percent of cases, as assessed by various criteria. (Table 7 lists controlled trials of these drugs, organized by class of drug.) Several studies have recorded uterine activity before and during drug treat-

Table 11. (Continued)

Author & Date	Ref. No.	Study Type	No. of Women	Dosage	Start of Treatment (Relative to first day of menses)	Assessment Criteria	% Experiencing Relief	Side Effects
Kapadia & Elder 1978	217	placebo crossover	44	200 mg 3×/day	Day 1	pain relief, vomiting and diarrhea, menstrual flow	82 significant pain relief	9%, dizziness or mild dyspepsia
Mefenamic acid								
Anderson et al. 1978	4	crossover	30	500 mg/8 hours	Day 1	drug preference vs. flufenamic acid, dextropropoxyphene-paracetaool combination, absenteeism, number of tablet and supplementary medications, dysmenorrhea symptoms	93	1 dizziness & nausea 1 headache 1 deep venous thrombosis
Budoff 1979	51	placebo crossover	34	250 mg 4×/day	Day 1	symptom frequency and severity, supplementary medication	significant difference from placebo	9%, gastrointestinal 3%, sleepiness
Tolfenamic acid								
Kauppila & Ylikorkala 1977	236	placebo crossover	27	133 mg 3×/day	Day −2	pelvic and back pain, absenteeism, menstrual flow, nausea, vomiting, diarrhea, all compared with indomethacin and placebo	88	"no marked side effects"
INDOLES Indomethacin								
Hamann & Laursen 1977	185	placebo crossover	60	100 mg + 25 mg 3×/day	Day 1	drug preference vs. placebo, daily activity, blood loss, supplementary medication, associated GI symptoms	90	23%
Kajanoja & Vesanto 1979	215	crossover	24	25 mg, 2-6 capsules/day as needed	Day 1	pain, menstrual flow, number of capsules, results compared with naproxen	73 moderate to good	29%, gastrointestinal 25%, central nervous system
Kauppila & Ylikorkala 1977	236	placebo crossover	27	25 mg 3×/day	Day −2	pelvic and back pain, absenteeism, menstrual flow, nausea, vomiting, diarrhea	87	"no marked side effects noted"
PYRAZOLES Phenylbutazone								
Black 1958	31	open	24	100 mg 3×/day	Day −2	complete or marked relief of dysmenorrheic pain and associated symptoms, daily activities	88	
SALICYLATES Acetylsalicylic acid (aspirin)								
Janbu et al. 1979	208	placebo crossover	30	500 mg 4×/day	Day 1	pain, blood loss, drug preference vs. paracetamol, placebo	no significant difference among drugs	3%, cardialgia

ment. They document marked reduction in contraction amplitude, frequency, and especially tone (116, 301, 302, 361, 362) (see Figure 5). Also, women report less menstrual blood loss (5, 51, 119, 236). Treatment with the PG synthetase inhibitors indomethacin, ibuprofen, and naproxen reduced high PGF levels in menstrual fluid to below normal (92, 362, 394). Indomethacin also lowered the concentration of circulating plasma PGF metabolite, which has some PG-like activity, to undetectable levels (305). Thus PG levels, which normally rise from the proliferative to the secretory phase and rise even higher in the menstrual phase, become abnormally high in dysmenorrhea, but they return to normal after treatment with PG inhibitors.

The newer PG synthetase inhibitors — naproxen, flufenamic acid, ibuprofen, mefenamic acid, and tolfenamic acid — help 75 to 95 percent of women. Often they eliminate dysmenorrheic symptoms such as diarrhea and vomiting even when uterine discomfort is not entirely alleviated. By contrast, some older, less potent PG synthesis inhibitors recently re-evaluated — aspirin, acetominophen, and dextropropoxyphene — showed no significant effect on symptoms (207). The practice, common with older PG inhibitors, of starting medication up to three days before the expected menstrual flow is not necessary with the newer compounds (301), thus avoiding any danger of drug exposure during a potential pregnancy.

In general, the side effects of PG synthesis inhibitors at high doses include gastrointestinal upsets like those seen with aspirin and, rarely, central nervous system effects such as headaches, mood changes, and dizziness. Other, even less frequent side effects include drug rash, blood disorders, bronchospasm, and liver and kidney disorders. The side effects of PG synthesis inhibitors at high doses in chronic users are well studied, since these drugs — also known as nonsteroidal anti-inflammatory agents — were originally approved in the US for relief of rheumatoid arthritis and gout. With the new PG inhibitors, side effects are seen in 10 percent of women or fewer and are limited usually to headache, dizziness, and gastric disturbances. The older PG synthesis inhibitor, indomethacin, tends to cause more side effects, especially when taken at higher doses; for example, 56 percent of women taking 50 mg three times daily suffered from side effects (35). Further, indomethacin and butazolidine are more likely to cause side effects other than gastric discomfort.

The mode of action of PG inhibitors in alleviating dysmenorrhea has been reasonably well documented. These drugs act by inhibiting the first enzyme in PG synthesis, cyclooxygenase (481). There is evidence that some inhibitors — for instance, the fenamates (a group of anthranilic acid derivatives) — also block PG action at the target tissue, stopping contraction of the human myometrium, for example (381).

PG inhibitors are now also being tested with promising results in the treatment of other gynecological conditions involving excessive endometrial PG levels, pain, bleeding, or uterine activity such as premature labor, dysmenorrhea due to IUD insertion (59, 321) or an IUD in situ (18, 446), endometriosis (31, 49, 234), and postpartum uterine pain (34). Many investigators have observed that dysmenorrhea decreases under placebo treatment, but the PG synthesis inhibitors are markedly more effective. They are more specific than oral contraceptives and progestins and, unlike steroids, need not be used throughout the cycle to be effective. They are definitely superior to other palliatives which have been recommended from time to time such as heating pads, vitamins, diet, alcohol, rest, exercise, hypnosis, psychotherapy, cervical dilatation, curettage, presacral neurectomy, hysterectomy, or pregnancy.

Premature Labor

PG synthesis inhibitors also can be used to quiet uterine activity in cases of premature labor, thus permitting gestation to continue. Research is in the early stages, however, and potential side effects on the fetus are unknown. The PG inhibitors used to date include indomethacin and flufenamic acid.

In a placebo-controlled test of indomethacin (25 mg every four hours for 24 hours), labor was arrested and did not recommence within 24 hours in 12 of 15 (80 percent) compared with 5 of 15 (33 percent) of controls, a result that did not quite achieve statistical significance (33). In a series of 50 women 31 to 32 weeks pregnant who received 100 mg of indomethacin in a rectal suppository, then 25 mg orally every six hours until 24

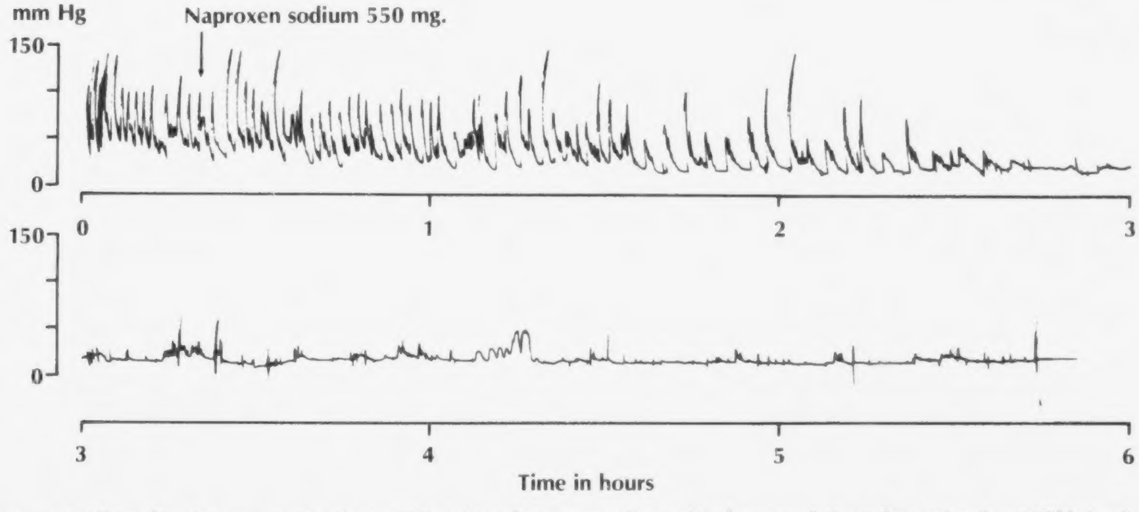


Figure 6. Recordings of uterine pressure show how a 500 mg dose of naproxen sodium quiets dysmenorrheic uterine contractions. Within two hours contractions have diminished and pain has disappeared.

Source: Lundstrom and Green (305)

hours after contractions ceased, 38 mature infants were delivered. This series was extended to 300 cases without any adverse effects observed in the infants born at term (505). Another clinic prescribed the same oral dose of indomethacin and succeeded in postponing delivery in eight of nine women in premature labor at 29 weeks or more (488).

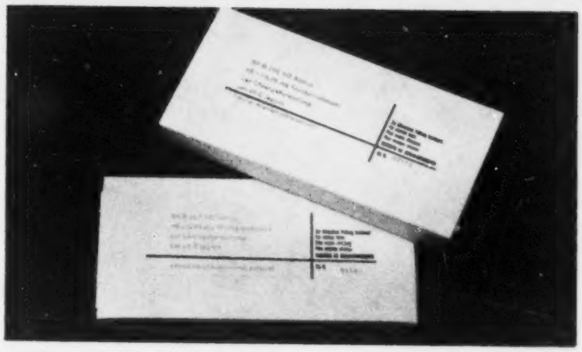
In another study, the fenamate drug, flufenamic acid, controlled premature labor for 48 hours or more, arrested uterine activity, and normalized PGF metabolite levels in 15 of 18 women (87 percent). These women, 28-36 weeks pregnant, took 200-400 mg flufenamicacid every 1-2 hours initially, then every 6 hours for four days. They experienced no gastrointestinal or respiratory side effects. There were 11 mature and 4 premature infants born an average of 17.9 days later. Two had symptoms suggesting possible pulmonary hypertension or distress, but both improved; one fetus was stillborn due to placental separation (519).

Previously, the only way to control preterm labor was to administer a less specific agent such as alcohol or a β-adrenergic drug. Because PG inhibitors interfere with all PG synthesis, they may compromise the circulation of the fetus by prematurely closing the ductus arteriosus. One of the functions of endogenous PGs in utero is to maintain this opening between the pulmonary artery and the aorta, to shunt blood past the fetal lungs. A few such incidents of closing the ductus have been reported during treatment with indomethacin (315) and aspirin (9) for other purposes. Minimal doses of PG synthesis inhibitors are used to stop premature labor, and none of the studies has reported serious problems.

NEW DERIVATIVES

Much of current prostaglandin research aims at developing better PG analogues — PGs with prolonged action, more specific effects on target tissues, greater stability, and fewer side effects. The analogues most thoroughly investigated — 15-methyl-$PGF_{2\alpha}$ and its methyl ester — clearly improve upon natural PGE_2 and $PGF_{2\alpha}$. They are as effective as the natural PGs or more so; often lower doses administered at longer intervals produce the same desired effects. The 15-methyl or 16,16-dimethyl groups joined to synthetic PGs hamper the action of 15-PG-dehydrogenase, the first enzyme that inactivates the PG; as a result, the PG is longer acting. Furthermore, some side effects — for example, pain at the site of an intramuscular injection — have been attenuated with the currently available analogues. Others, however — such as gastrointestinal and body temperature effects — remain difficult to manage. The stability of the compounds also remains a problem. The instability of the natural PGE_2 at room temperature is well known, but instability also characterizes some of the otherwise much improved derivatives of PGE_2.

How to solve all the problems of PGs in one synthetic compound is the puzzle facing PG researchers. Results have often been frustrating, as in the case of 16,16-dimethyl-PGE_2-p-benzaldehyde semicarbazone ester. For abortion, the analogue has proved effective, with few side effects. Over 90 percent of 54 women in the late first trimester and the second trimester aborted within 36 hours after receiving up to four vaginal suppositories containing 750 μg each. Although prophylactic medication was limited to intramuscular analgesics with no antiemetics or antidiarrheal agents given, only five women vomited, three had diarrhea, and two had transient fever — a marked improvement over results with PGE_2 (228). For cervical dilation, again the new drug proved effective and caused few side effects. Cervices of 70 percent of 124 women in the first trimester were dilated to 8 mm or more within five hours after administration of a single suppository. There was only one instance of diarrhea and two of transient fever (229). Yet this effective and well-tolerated drug can be kept only two weeks in suppository form, deep frozen at -4° F, because of the instability of the natural PGE_2 ring. The search for new PG derivatives is beginning to yield analogues that improve upon older PGs in one or several ways. Among the new derivatives now being studied are three with primarily oxytocic effects, one with enhanced stability, and two with potentially luteolytic effects.



Sulprostone (SH B 286), manufactured by Schering AG, may soon be registered in West Germany. (Schering AG)

Sulprostone

Sulprostone is a PGE_2 derivative with remarkably selective oxytocic effects. Developed by Pfizer Incorporated, USA, its formula is 16-phenoxy-ω-tetranor-PGE_2 methylsulfonylamide (see Figure 7). It was tested clinically between 1974 and 1978 in over 5,000 women from 13 countries under the auspices of Schering AG of Berlin (454).

Initial animal studies showed that sulprostone aborts guinea pigs 43 to 44 days pregnant solely by stimulating uterine contractions; it is not luteolytic in rats (142, 197). Sulprostone did not stimulate the guinea pig small intestine or cause bronchoconstriction in histamine-primed guinea pigs, as do other PGs (142), suggesting that it would be associated with little diarrhea or asthma.

Clinical trials at first concentrated on intravenous administration because it permits good control over dose rates, blood levels, and, consequently, side effects. Later trials have explored the extra- and intraamniotic routes and, more recently, the intramuscular route. Vaginal suppositories have proved relatively ineffective (388). In these clinical trials, as a rule women received no premedication for nausea, vomiting, or diarrhea, as is virtually universal practice with natural PGs and their other analogues. With sulprostone, diarrhea is very rare; nausea with or without vomiting is somewhat more common. Since sulprostone very specifically stimulates the uterine myometrium, pain or cramps are a characteristic complaint, and during clinical trials women frequently have been given pain medication. A feature of most of these clinical studies is the inclusion of first and second trimester abortions and sometimes mole and missed abortion or fetal death all in the same series of cases.

Administered intravenously in trials involving primarily abortion patients, sulprostone proved moderately successful. Side

Table 12. Abortion and Labor Induced by Sulprostone, by Route of Administration, Selected Studies, 1977-1980

Author & Date	Ref. No.	No. of Women	Description of Cases	Dosage	% Effective (% Complete)	Mean Hours	% Experiencing Side Effects: Pain	Nausea	Vomiting	Diarrhea	Other
Intravenous											
Schüssler et al. 1979	390	14	abortion, 5-12 weeks	1.7 μg/minute for 5 hours to maximum 500 μg	29 (7)	12.2	29	36	21	0	
		77		1.7 μg/minute for 10 hours to maximum 1,000 μg	87 (77)		26	13	8	1.3	cold & fever: 2.6
		40		2.8 μg/minute for 6 hours to maximum 1,000 μg	65 (55)		48	38	30	0	cold & fever: 2.5
		35		4.1 μg/minute for 6 hours to maximum 1,500 μg	66 (29)		83	68	54	3	cold & fever: 14.3
Ulbrich & Bartels 1978	454	298	1st & 2nd trimester abortion; missed abortion; mole	250 μg/hour to maximum 1,500 μg	72						all: 51
		121		250 μg/hour to maximum 1,000 μg	64						all: 55
Extraovular											
Dennemark & Semrau 1978	122	111	1st trimester abortion	25 μg	96		49	— 28 —			other: 6
Karim et al. 1977	226	240	abortion, 5-6 weeks	50 μg	95		14		5	0	headache: 4
Ulbrich & Bartels 1978	454	599	1st & 2nd trimester abortion, missed abortion; mole	25 or 50 μg	73						all: 29
Intraamniotic											
Lichtenegger 1977	287	15	abortion, 13-29 weeks	828 μg	90	17.2					headache: 11
Van den Berg & Niermeijer 1978	466	4	abortion, 20 weeks or more, all young nulliparas	1 mg	50	26	0	— 0 —		0	
		20		2 mg	55	20	35	— 30 —		10	cold: 6 drowsiness: 6 shock: 6
		22		3 mg	68	14	9	— 5 —		0	
		18		4 mg	96	17	83	— 22 —		6	
Intramuscular injection											
Csapo et al. 1980	112	90	mean 7 weeks	2 × .5 mg/4 hours in 81%	96 (96)		66		26	10	endometritis: 2
Karim et al.1978	223	20	abortion, 14-24 weeks	0.5 mg/4 hours	90	18.0		15	20	5	cold: 0
		20		1 mg/8 hours	90	20.5		10	40	10	cold: 5
		20		1 mg/6 hours	95	18.25		15	30	10	cold: 5
Lehmann 1978	280	49	abortion, 13-31 weeks; fetal death; anencephaly	0.5 mg/4 hours to mean 5.9 injections	98 (61)	18.3	51	51	41	6	
Schmidt-Gollwitzer et al. 1978	389	21	1st & 2nd trimester abortion (93% and 7%, respectively)	0.5 mg	57 (48)		32	18	13		
		29		0.5 mg/4 hours × 2	72 (55)						
		25		0.5 mg/6 hours × 2	80 (52)						
		44		0.5 mg/8 hours × 2	77 (55)						
		61		0.5 mg/4 hours × 3	82 (51)						
Ulbrich & Bartels 1978	454	138	1st & 2nd trimester abortion; missed abortion; mole	0.5 mg/4 hours	95						all: 51
		26		0.5 mg/6 hours	96						all: 23
		153		1.0 mg/6 hours	93						all: 41

effect rates were low compared with rates for intravenous administration of other PGs; irritation at the infusion site was negligible. Doses ranged from 1 to 2 mg over 3 to 10 hours. A dose rate of 1.7 μg per minute over 10 hours, totaling 1 mg, was the most effective, with the fewest side effects (391). Success rates in most studies have ranged from 70 to 100 percent; mean abortion times have varied from 8 to 12 hours; pain has occurred in 40 to 80 percent of women, and other side effects in 20 to 30 percent (384).

The extraamniotic route, as expected, elicited fewer peripheral side effects and allowed lower doses: 25 to 50 μg proved effective. Several clinicians have reported success rates of 70 to 100 percent, with mean abortion times of 12 to 18 hours. Uterine pain occurs in about half of the women; other complaints, in 20 to 30 percent (384).

Intraamniotic instillation of sulprostone also has been effective, with fewer side effects than with the older analogues. Doses of 1 to 4 mg administered via the vagina produced abortion in 50 to 96 percent of nulliparas. Uterine pain was dose-related and occurred in up to 15 percent of the women, but other side effects appeared not dose-related (466). In another series, 16 of 18 women given .823 mg sulprostone aborted successfully in a mean 17.2 hours, with two headaches the only reported side effects (287).

Intramuscular injection of sulprostone is currently under study in some clinics in Europe. Most report success rates of 93 to 100 percent, usually after two or three 500 μg doses at 4- to 6-hour intervals. Nausea or vomiting rates usually hover around 30 percent, and uterine pain, around 30 to 50 percent (384). Many researchers have commented on the absence of side effects in the majority of women, the lack of cervical trauma, and the general acceptance of this method by women (384). In fact, several consider sulprostone the preferred method for midtrimester abortion (182, 389, 465).

Arpad Csapo and colleagues have reported good preliminary results in the US, Finland, and Hungary in terminating early first trimester pregnancies (menstrual induction) (112). One to four injections four hours apart in 90 women an average of 45 days after their last menstrual period produced complete abortion in 96 percent. Side effects included cramps requiring sedation in 66 percent, vomiting in 26 percent, and diarrhea in 10 percent. In interviews with about half the women, 90 percent were satisfied with the procedure and of those who had previously experienced surgical interruption, 89 percent preferred the pharmacological method (112). More research of this nature, testing which procedures women prefer, would be useful, once efficacy and safety have been established.

Given by the intracervical or intramuscular route, sulprostone can dilate the cervix in late first trimester. In three studies, 25 μg injected into cervical tissue (intramurally) dilated 98 percent of women sufficiently for vacuum aspiration in 4 hours (454) or 83 and 90 percent in 12 hours (40, 454). Karim was able to aspirate 75 percent of his abortion patients without further cervical dilatation three hours after they received 500 μg intramuscularly, and the remainder were dilated to 4 to 7 mm at that point (225). Side effects occurred in 15 percent or fewer in all these studies.

Since sulprostone administered by the noninvasive, intramuscular route is effective and acceptable even without premedication against vomiting and diarrhea, it clearly improves upon natural $PGF_{2\alpha}$. Further, it does not elicit fever or chills like natural PGE_2. For early first trimester use, it may eventually become an acceptable alternative to vacuum aspiration. Schering AG is currently completing a license application to the German Federal Health Authority for sulprostone (387).

ONO-802

Another uterine-specific PG analogue, 16,16-dimethy-trans-Δ^2-PGE_1 methyl ester — ONO-802 — has progressed to clinical trials (see Figure 7). It is 10 to 100 times as potent as the primary PGs — PGE_1, PGE_2, and $PGF_{2\alpha}$ — measured by its contractile effect on the pregnant rat uterus. While the parent compound PGE_1, has a less potent effect on the uterus than PGE_2 or $PGF_{2\alpha}$, ONO-802 resembles $PGF_{2\alpha}$ in its contractile effect on the uterus in nonpregnant and pregnant rats and hamsters. It does not act through the nervous system, nor does it induce further PG release, but cAMP and calcium are involved in its action (322). Like PGE_1, ONO-802 causes abortion in rats in early and late pregnancy. Unlike the effects of PGE_2 and $PGF_{2\alpha}$ in animals, this abortifacient effect is not due to luteolysis. No consistent decrease in progesterone levels is associated with the uterine contractions that precipitate abortion (323).

Clinical trials of ONO-802 demonstrate its effectiveness and low incidence of side effects. Over 90 percent of 45 women 4 to 49 days past their expected menses aborted completely after receiving 20 to 40 μg of ONO-802 instilled into the uterus in either one or two doses. All but 10 were premedicated with atropine and pentazocine as analgesics; only 20 percent had nausea, 16 percent vomited, and 11 percent reported pain (428). Two trials involving women in early pregnancy employed .5 to 1.0 mg vaginal suppositories given every three hours for up to five doses, with similar results — 86 and 92 percent complete abortions. Side effects in these unpremedicated women included nausea in 2.2 percent, vomiting in 4 percent, diarrhea in 6 percent, and weakness in 4 percent (227). A trial with the same regimen in women 5 to 15 weeks pregnant achieved 89 percent effective abortions and 83 percent complete abortions. Ten percent of these women experienced nausea or vomiting; 25 percent, pain; 33 percent, diarrhea; and 10 percent, headache (445).

Clinical evaluation of ONO-802 is continuing in Japan and elsewhere. The ONO Pharmaceutical Company hopes to apply in 1980 to the Japanese drug regulatory agency for permission to market the PGE_1 analogue (449).

9-deoxo-16,16-dimethyl-9-methylene-PGE_2

A new PGE_2 derivative with both increased stability and enhanced uterine-stimulating activity is Upjohn's 9-deoxo-16,16-dimethyl-9-methylene-PGE_2 (see Figure 7). According to evidence from abortion studies in rhesus monkeys, tests for side effects in several animals, and preliminary clinical trials for second trimester abortion, the action of this agent is very specific to the uterus. In pregnant rhesus monkeys the threshold dose for uterine stimulation is 1 μg, or about one-fifteenth that of PGE_2 administered intravenously and one-twenty-fifth that of PGE_2 administered vaginally. Doses of 500 μg or more given in vaginal suppositories induced abortion. The monkeys showed neither gastrointestinal side effects nor appetite depression. Dose-response studies on colon activity in gerbils and gastric secretion, intestinal fluid pooling, and uterine activity in rats indicate that this agent is more specific to the uterus than PGE_2 (240).

In a preliminary clinical trial, 24 women in the second trimester of pregnancy received two vaginal suppositories, each containing 75 mg of the PGE_2 derivative, eight hours apart. Twenty aborted within 24 hours, and one more within 26 hours. The women were not premedicated against side effects; 11 vomited and one had diarrhea (66). Doses of 60 mg are now being tested. This analogue has also reportedly proved effective in a small series for abortion in the early first trimester and for cervical dilatation in the first trimester (462).

Stable Analogues

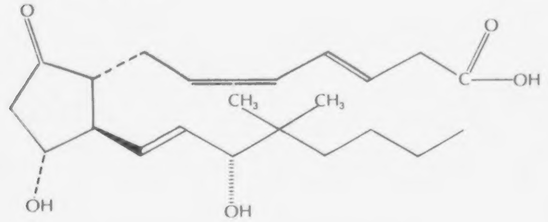
Imperial Chemical Industries (ICI) Ltd., Great Britain, has altered the 9-keto group on the PGE$_2$ ring to enhance the stability of several new derivatives. Replacing the unstable 9-keto group in the PGE ring with a 9-deoxy or 9β-phenoxy function improves stability. The new compounds show most of the activities of PGE$_2$ when assessed in a guinea pig abortion test on day 65 of pregnancy, a rat stomach acid test, and a PGE$_2$ receptor binding test in bovine corpus luteum in vitro (319).

Luteolytic PGs

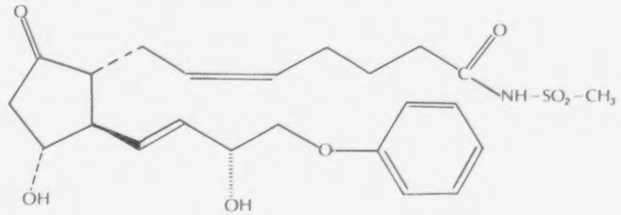
Two luteolytic, rather than uterus-stimulating, series of PGF$_{2\alpha}$ derivatives have been developed recently, one in the US, one in the Federal Republic of Germany. Results of animal studies are promising, but neither has yet been tested in women.

The luteolytic PGF$_{2\alpha}$ derivatives developed by John A. McCracken and colleagues at the Worcester Foundation for Experimental Biology in the US all have an acetylenic 13-dehydro structure (324). The most active compound is 16-fluoro-13-dehydro-PGF$_{2\alpha}$ (see Figure 7). This analogue was assayed for luteolytic effects in sheep by autotransplanting an ovary to the neck, where progesterone release directly from the ovary can be monitored easily throughout the estrous cycle. In this assay, the new compound was 100 times as active intravenously as the parent PGF$_{2\alpha}$. In cycling monkeys *(Macaca*

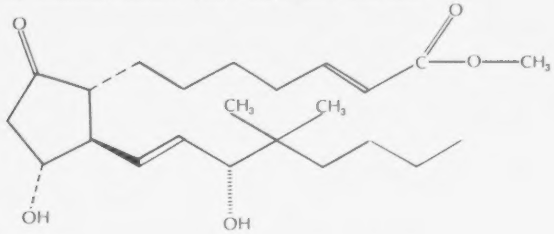
16,16-dimethyl-PGE$_2$



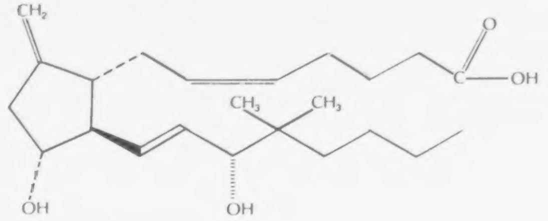
16-phenoxy-ω-tetranor-PGE$_2$ methylsulfonylamide (sulprostone)



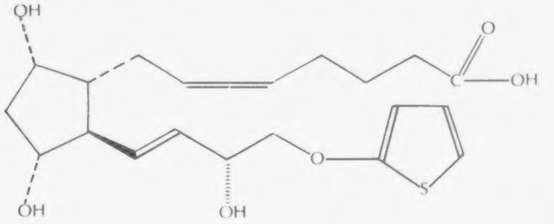
16, 16-dimethyl-trans-Δ^2-PGE$_1$ methyl ester (ONO-802)



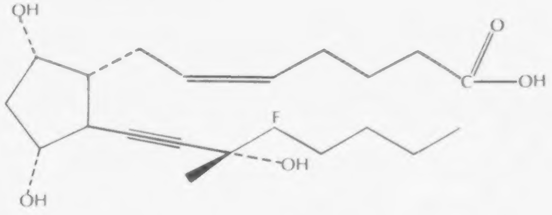
9-deoxo-16,16-dimethyl-9-methylene-PGE$_2$



17, 18, 19, 20-tetranor-16$_{\alpha}$-thienyloxy-PGF$_{2\alpha}$ (HR 837)



16-fluoro-13-dehydro-PGF$_{2\alpha}$



9β-phenoxy-16,16-dimethyl-16-m-chloro-phenoxy-ω-tetranor-PGE$_2$ (ICI 132, 932)

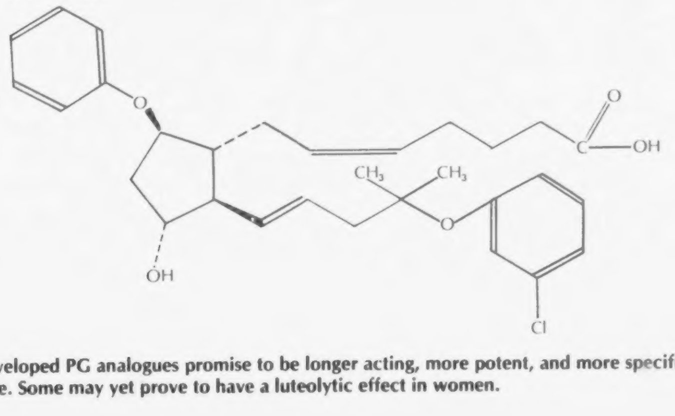


Figure 7. Various newly developed PG analogues promise to be longer acting, more potent, and more specific, with fewer side effects, than the prostaglandins now available. Some may yet prove to have a luteolytic effect in women.

fascicularis), 5 μg of 13-dehydro-$PGF_{2\alpha}$ infused for six hours caused luteolysis in the midluteal phase of the menstrual cycle, and the 16-fluoro derivative was even more potent. Luteolytic doses caused little or no uterine activity in sheep, and in monkeys as much as 2 mg intravenously failed to start uterine contractions. These observations suggest that in new PG analogues luteolytic action can be separated from uterus-stimulating action (324).

Scientists at Hoechst AG, Frankfurt-am-Main, Federal Republic of Germany, have synthesized another series of luteolytic $PGF_{2\alpha}$ derivatives. The most effective compound is HR 837 (17,18,19,20-tetranor-16_{α}-thienyloxy-$PGF_{2\alpha}$). When injected into hamsters in single subcutaneous doses on days four, five, and six of pregnancy, this analogue proved about 100 times as effective in terminating pregnancy as $PGF_{2\alpha}$. A dose of 0.2 mg/day aborted 50 percent of the animals. HR 837 was also luteolytic in pseudopregnant rats and heifers and in cycling and pregnant guinea pigs (379). The rat stomach strip screening test for gastrointestinal activity, which suggests the frequency of gastrointestinal side effects, found this agent only three to four times as potent as $PGF_{2\alpha}$. The ethoxyethyl ester of the 16-thienyloxy $PGF_{2\alpha}$ analogue was 400 times as effective a luteolysin as $PGF_{2\alpha}$. Several other variations, such as a β orientation of the thienyloxy group, replacing the ether linkage with other types of linking groups, or varying the chain length, produced compounds with less luteolytic activity, although some were still more active than the natural $PGF_{2\alpha}$ (12). Comparisons, like these, of the activities of various newly synthesized PGs can lead to an understanding of which chemical structures on the molecule are responsible for which biological effects.

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The currently available natural PGs and analogues compete with other techniques in a variety of uses — particularly induction of labor, cervical dilation, second trimester abortion, and various complications of pregnancy. The promising derivatives developed in recent years and newer analogues not yet tested may some day supplant present techniques. Already PGs are a preferred method for treatment of mole, missed abortion, and fetal death. If research can produce more analogues with the desired combination of features — potency, specificity, prolonged action, and stability — and if these products can be made fully available so that health care providers and health care consumers will be able to choose the most appropriate procedures for any given need — then the role of prostaglandins in reproductive health care will surely grow.

BIBLIOGRAPHY

Asterisk (*) designates an article that was of particular value in the preparation of this issue of **Population Reports.**

1. ANONYMOUS. Editorial comment [on WHO collaborative trials]. American Journal of Obstetrics and Gynecology 129(6): 605-606. November 15, 1977.

2. AKSEL, S., SCHOMBERG, D. W., and HAMMOND, C. B. Prostaglandin $F_{2\alpha}$ production by the human ovary. Obstetrics and Gynecology 50(3): 347-350. September 1977.

3. AMY, J.J. Complication of prostaglandin induced abortion. British Medical Journal 4(5945): 654. 1974.

4. ANDERSON, A.B.M., HAYNES, P.J., FRASER, I.S., and TURNBULL, A.C. Trial of prostaglandin-synthetase inhibitors in primary dysmenorrhoea. Lancet 1(8060): 345-348. February 18, 1978.

5. ANDERSON, A.B.M., HAYNES, P.J. GUILLEBAUD, J., and TURNBULL, A.C. Reduction of menstrual blood-loss by prostaglandin synthetase inhibitors. Lancet 1(7949): 774-776. April 10, 1976.

6. ANDERSON, G.G., HOBBINS, J.C., SPEROFF, L., and CALDWELL, B.V. Intravenous prostaglandins E_2 and $F_{2\alpha}$ and $F_{2\alpha}$ and Syntocinon for the induction of term labor. In: Southern, E.M., ed. The prostaglandins: clinical applications in human reproduction. [Brook Lodge Symposium, Augusta, Michigan] Mount Kisco, New York, Futura Publishing Co., 1972. p. 85-94.

7. ANG, L.T., NG, K.H., SIVANESARATNAM, V., SINNATHURAY, T.A., and YUSOF, K. Inducing labor with oral prostaglandin E_2 tablets. International Journal of Gynaecology and Obstetrics 15(5): 415-418. April-May 1978.

8. ANTEBY, S.O., SEGAL, S., and POLISHUK, W.Z. Termination of midtrimester pregnancy by intra-amniotic injection of urea. Obstetrics and Gynecology 43(5): 765-768. May 1974.

9. ARCILLA, R.A., THILENIUS, O.G., and RANNIGER, K. Congestive heart failure from suspected ductal closure in utero. Journal of Pediatrics 75(1): 74-78. July 1969.

10. AUFDERHEIDE, J. [Upjohn Company] [Marketing of prostaglandins] Personal communication. August 22, 1979.

11. BALLARD, C.A., FORTE, K., and LAUERSEN, N.H. Plasma prostaglandin concentration and abortifacient effectiveness of a single insertion of a 3 mg 15(S)-methyl-prostaglandin $F_{2\alpha}$ methyl ester vaginal suppository. Contraception 17(4): 383-391. April 1978.

12. BARTMANN, W., BECK, G., LERCH, U., TEUFEL, H., and SCHÖLKENS, B. Luteolytic prostaglandins: synthesis and biological activity. Prostaglandins 19(2): 301-311. February 1979.

13. BEAL, P.F., 3rd, FONKEN, G.S., and PIKE, J.E. Microbiological conversion of unsaturated fatty acids. [Patent] No. 3,296,091, patented January 3, 1967. [Washington, D.C.], United States Patent Office, [1967]. 8 p.

*14. BEHRMAN, H.R. Prostaglandins in hypothalamo-pituitary and ovarian function. Annual Review of Physiology 41: 685-700. 1979.

15. BENDITT, J. Second-trimester abortion in the United States. Family Planning Perspectives 11(6): 358-361. November-December 1979.

16. BENDZ, A. The anatomical basis for a possible counter current exchange mechanism in the human adnex. Prostaglandins 13(2): 355-362. February 1977.

17. BERGER, G.S. and EDELMAN, D.A. A clinical comparison of prostaglandin $F_{2\alpha}$ and intra-amniotic saline for induction of midtrimester abortion. Annales Chirurgiae et Gynaecologiae Fenniae 66(1): 55-58. 1977.

18. BERGER, G.S. and KERENYI, T.D. Analysis of retained placenta associated with saline abortion: clinical considerations. American Journal of Obstetrics and Gynecology 120(4): 484-488. October 1974.

19. BERGQVIST, C. and NYBERG, R. Intraamniotic and intramuscular administration of 15-methyl prostaglandin $F_{2\alpha}$ for midtrimester abortion. Acta Obstetricia et Gynecologica Scandinavica (Suppl. 66): 19-26. 1977.

20. BERGSJØ, P. Socioeconomic implication of dysmenorrhea. Acta Obstetricia et Gynecologica Scandinavica (Suppl. 87): 67-68. 1979.

21. BERGSTRÖM, S., DANIELSSON, H., and SAMUELSSON, B. The enzymatic formation of prostaglandin E_2 from arachidonic acid. Biochimica et Biophysica Acta 90: 207-210. 1964.

22. BERGSTRÖM, S., GRÉEN, K., and BYGDEMAN, M. Metabolism and pharmaco-kinetics of 15-methyl $PGF_{2\alpha}$ and its ester after administration via various routes. Prostaglandins 12(Suppl.): 17-26. 1976.

23. BERGSTRÖM, S., RYHAGE, R., SAMUELSSON, B., and SJOVALL, J. The structure of prostaglandin E, F_1 and F_2. Acta Chemica Scandinavica 16(Pt. 1, 2): 501-502. 1962.

24. BERGSTRÖM, S. and SJOVALL, J. The isolation of prostaglandin. Acta Chemica Scandinavica 11(6): 1086. 1957.

25. BERGSTRÖM, S. and SJOVALL, J. The isolation of prostaglandin E from sheep prostate glands. Acta Chemica Scandinavica 14(Pt. 2, 8): 1701-1705. 1960.

26. BERMAN, R., HALE, R.W., REICH, L.A., and PION, R.J. Intra-amniotic prostaglandin $PGF_{2\alpha}$ (tham salt) and the laminaria tent in midtrimester termination of pregnancy. Contraception 9(6): 635-642. June 1974.

27. BHATT, R.V., BHIWANDIWALA, P., PATHAK, N.D., CHAUHAN, L.N., and MULGAONKAR, V.B. Vaginal suppositories study of 15(S)-15-methyl prostaglandin $F_{2\alpha}$ tromethamine salt for induction of abortion: an early experience. In: Pachauri, S., ed. Fourth transaction of scientific papers at the India FRP Contributors' Conference, Bombay, [India], February 24, 1977. Calcutta, India, India Fertility Research Programme, September 1977. p. 55-58.

28. BHATT, R.V., PACHAURI, S., KOSHY, E., CHAUMAN, L., and MULGAONKAR, V. Midtrimester abortion with prostaglandin and hypertonic saline: a comparative study. International Journal of Gynaecology and Obstetrics 16(3): 254-258. November-December 1978.

29. BIENIARZ, J., HUNTER, G., SCOMMEGNA, A., and ALTAMIRANO, Z. Efficacy and acceptability of 15(S)-15-methyl-prostaglandin E_2 methyl ester for midtrimester pregnancy termination. American Journal of Obstetrics and Gynecology 120(6): 840-843. November 15, 1974.

30. BISHOP, E.H. Pelvic scoring for elective induction. Obstetrics and Gynecology 24(2): 266-268. August 1964.

31. BLACK, E.F.E. The treatment of dysmenorrhea with phenylbutazone. Canadian Medical Association Journal 79: 752-753. November 1, 1958.

32. BLAKE, D.A., BURNETT, L.S., MIYASAKI, B.C., LONGSTRETH, J.A., and KING, T.M. Pharmacokinetics of intra-amniotically administered hyperosmolar urea in rhesus monkeys. American Journal of Obstetrics and Gynecology 124(3): 245-250. February 1, 1976.

33. BLAKE, D.A., NIEBYL, J.R., WHITE, R.D., KUMOR, K.M., DUBIN, N.H., ROBINSON, J.C., and EGNER, P.G. Treatment of premature labor with indomethacin. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. (To be published by Raven Press)

34. BLOOMFIELD, S.S., BARDEN, T.P., and MITCHELL, J. Naproxen, aspirin, and codeine in postpartum uterine pain. Clinical Pharmacology and Therapeutics 21(4): 414-421. April 1977.

35. BOEHM, F.H. and SARRATT, H. Indomethacin for the treatment of dysmenorrhea: a preliminary report. Journal of Reproductive Medicine 15(2): 84-86. August 1975.

36. BOLOGNESE, R.J. and CORSON, S.L. The effect of vaginally administered prostaglandin $F_{2\alpha}$ on corpus luteum function. American Journal of Obstetrics and Gynecology 117(2): 240-245. September 15, 1973.

37. BORELL, U., EMBREY, M.P., BYGDEMAN, M., HENDRICKS, C.H., and KINCH, R. Reply to Dr. Grimes and associates. [Letter] American Journal of Obstetrics and Gynecology 131(1): 232. May 15, 1978.

38. BOSTOFTE, E., STAKEMANN, G., and STOCKLUND, K.-E. A comparison of termination of pregnancies in the 2nd trimester induced by intraamniotic injection of hypertonic saline, prostaglandin $F_{2\alpha}$ or both drugs. Acta Obstetricia et Gynecologica Scandinavica (Suppl. 37): 47-50. 1975.

39. BOULLAYE, H., de la, LIESSE, A.-E., CAVROT, E., LAMIROY, H., and VAN BROECKHOVEN, J. Etude comparative en double insu de l'alclofenac et d'un placébo dans le traitement symptomatique de la dysménorrhée. [Comparative double blind study of alcofenac and placebo for symptomatic treatment of dysmenorrhea.] [FR] Revue Française de Gynécologie 66(8-9): 525-529. January 1971.

40. BRABEC, W., DAPUNT, O., and BICHLER, A. Our clinical experiences with sulprostone. In: Schering AG. International Sulprostone Symposium, Vienna, 1978: scientific papers. Groton, Connecticut, Pfizer, Inc., [1978]. (Paper 18) 16 p.

41. BRENNER, P.F., BALLARD, C., and MISHELL, D.R., Jr. Termination of early gestation with a vaginal polysiloxane device impregnated with (15S)-15 methyl prostaglandin $F_{2\alpha}$ methyl ester. Prostaglandins 14(4): 771-777. October 1977.

*42. BRENNER, W.E. and BERGER, G.S. Pharmacological methods of inducing midtrimester abortion: risks and benefits. Presented at the Program for Applied Research on Fertility Regulation [PARFR] Workshop on Risks, Benefits, and Controversies in Fertility Control, Arlington, Virginia, March 13-16, 1977. 58 p.

43. BRENNER, W.E., DINGFELDER, J.R., STAUROVSKY, L.G., and HENDRICKS, C.H. Vaginally administered $PGF_{2\alpha}$ for cervical dilatation in nulliparas prior to suction curettage. Prostaglandins 4(6): 819-836. December 1973.

*44. BRENNER, W.E. and EDELMAN, D.A. Therapeutic abortion by dilatation and evacuation in the 13 to 15 weeks' gestation gravida versus intra-amniotic saline instillation after 15 weeks' gestation. Contraception 10(2): 171-180. August 1974.

45. BRENNER, W.E., HENDRICKS, C.H., DINGFELDER, J., and STAUROVSKY, L. Laminaria augmentation of intra-amniotic prostaglandin $F_{2\alpha}$ for the induction of mid-trimester abortion. Prostaglandins 3(6): 879-894. June 1973.

46. BROWN, J.S. The effect of orally administered androgens on sperm motility. Fertility and Sterility 26(4): 305-308. April 1975.

47. BRUCE, N.W. and HILLIER, K. The effect of prostaglandin $F_{2\alpha}$ on ovarian blood flow and corpora lutea regression in the rabbit. Nature 249: 176-177. May 10, 1974.

48. BUCKINGHAM, J.C., SELDEN, R., and DANFORTH, D.N. Connective tissue changes in the cervix during pregnancy and labor. Annals of the New York Academy of Sciences 97(1): 733-742. May 3, 1962.

49. BUDOFF, P.W. [Woodbury, New York] [Dysmenorrhea/endometriosis] Personal communication. July 23, 1979.

50. BUDOFF, P.W. Mefenamicacid for dysmenorrhea in patients with intrauterine devices. [Letter] Journal of the American Medical Association 242(7): 616-617. August 17, 1979.

51. BUDOFF, P.W. Mefenamic acid in treatment of primary dysmenorrhea. Presented at the 4th International Prostaglandin Conference Washington, D.C., May 27-31, 1979. 4 p.

52. BUNDY, G., LINCOLN, F., NELSON, N., PIKE, J., and SCHNEIDER, W. Novel prostaglandin syntheses. Annals of the New York Academy of Sciences 180: 76-90. 1971.

53. BURKMAN, R.T. [The Johns Hopkins University] [Prostaglandin dose in combination with urea] Personal communication, January 25, 1980.

*54. BURKMAN, R.T., ATIENZA, M.F., KING, T.M., TONASCIA, J.A., PANG, J.C.K., and WHITMORE, A.J. Hyperosmolar urea for elective midtimester abortion. American Journal of Obstetrics and Gynecology 131(1): 10-17. May 1, 1978.

55. BURKMAN, R.T., Jr., DUBIN, N.H., and KING, T.M. The use of hyperosmolar urea for the elective abortion of midtrimester pregnancy. In: Zatuchni, G.I., Sciarra, J.J., and Speidel, J.J., eds. Pregnancy termination: procedures, safety, and new developments. [Proceedings of the workshop, Nassau, Bahamas, May 23-26, 1978] Hagerstown, Maryland, Harper and Row, 1979. (PARFR Series on Fertility Regulation) p. 261-267.

56. BURKMAN, R.T., KING, T.M., and ATIENZA, M.F. Hyperosmolar urea as a midtrimester abortifacient. Presented at the Program for Applied Research on Fertility Regulation [PARFR] Workshop on Risks, Benefits, and Controversies in Fertility Control, Arlington, Virginia, March 13-16, 1977. 18 p.

57. BURNHILL, M.S., ARMSTEAD, J.W., KESSEL, E., and MILLER, E.R. Computer assisted evaluation of demographic trends and morbidity data in first trimester vacuum aspiration. Presented at the 14th Annual Scientific Meeting of the Association of Planned Parenthood Physicians, Miami Beach, Florida, November 10-12, 1976. Chapel Hill, North Carolina, International Fertility Research Program, 1976. (Pregnancy Termination Series 102) 13 p.

58. BURT, R.L., CONNOR, E.D., and DAVIDSON, I.W.F. Hypokalemia and cardiac arrhythmia associated with prostaglandin-induced abortion. Obstetrics and Gynecology 50(1, Suppl.): 455-465. July 1977.

59. BUTTRAM, V., IZU, A., and HENZL, M.R. Naproxen sodium in uterine pain following intrauterine contraceptive device insertion. American Journal of Obstetrics and Gynecology 134(5): 575-578. July 1, 1979.

60. BYGDEMAN, M. The effect of different prostaglandins on human myometrium in vitro. Acta Physiologica Scandinavica 63(Suppl. 242): 1-78. 1964-1965.

*61. BYGDEMAN, M. Menstrual regulation with prostaglandin. In: Karim, S.M.M., ed. Advances in prostaglandin research: practical application of prostaglandins and their synthetic inhibitors. (To be published)

62. BYGDEMAN, M., BEGUIN, F., TOPPOZADA, M., WIQVIST, N., and BERGSTRÖM, S. Intrauterine administration of 15(S)-15-methyl-prostaglandin $F_{2\alpha}$ for induction of abortion. Lancet 1: 1336-1337. 1972.

*63. BYGDEMAN, M. and BERGSTRÖM, S. Clinical use of prostaglandins for pregnancy termination. Population Reports, Series G, No. 7. Population Information Program, September 1976. 10 p.

64. BYGDEMAN, M., FREDERICSSON, B., SVANBORG, K., and SAMUELSSON, B. The relation between fertility and prostaglandin content of seminal fluid in man. Fertility and Sterility 21(8): 622-629. August 1970.

65. BYGDEMAN, M. and GRÉEN, K. Development of simple and effective abortion methods based on vaginal administration of prostaglandin analogues. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. (To be published by Raven Press)

66. BYGDEMAN, M., GRÉEN, K., BERGSTRÖM, S., BUNDY, G., and KIMBALL, F. New prostaglandin F_2 analogue for pregnancy termination. [Letter] Lancet 1(8126): 1136. May 26, 1979.

67. BYGDEMAN, M., GRÉEN, K., and LUNDSTRÖM, U. Interruption of first trimester pregnancy by prostaglandins. International Journal of Gynaecology and Obstetrics 15(1): 69-72. July-August 1977.

68. BYGDEMAN, M., GRÉEN, K., and LUNDSTRÖM, V. Utveckling av ett lånverkande vagitorium lämpligt för avbrytande av graviditet i andra trimestern ech för preoperativ cervixdilatation. [Development of a long-acting vaginal suppository for termination of second trimester pregnancy and cervical dilatation.] [SW] Laekartidningen 74(46): 4107-4109. November 16, 1977.

69. BYGDEMAN, M., GRÉEN, K., LUNDSTRÖM, V., RAMADAN, M., FOTIOU, S., and BERGSTRÖM, S. Induction of abortion by vaginal administration of 15(S)15-methyl prostaglandin $F_{2\alpha}$ methyl ester: a comparison of two delivery systems. Prostaglandins 12(Suppl.): 27-52. 1976.

70. BYGDEMAN, M., KWON, S.U., MUKHERJEE, T., and WIQVIST, N. Effect of intravenous infusion of prostaglandin E_1 and E_2 on motility of the pregnant human uterus: prostaglandins and related factors. American Journal of Obstetrics and Gynecology 102(3): 317-326. October 1, 1968.

71. BYGDEMAN, M., KWON, S., and WIQVIST, N. The effect of prostaglandin E_1 on human pregnant myometrium in vivo. In: Bergstrom, S. and Samuelsson, B., eds. Prostaglandins. Proceedings of the 2nd Nobel Symposium, Stockholm, Sweden, June 1966. New York, International Publishers, 1967. p. 93-96.

72. BYGDEMAN, M., MARTIN, J.N., Jr., LEADER, A., LUNDSTRÖM, V., RAMADAN, M., ENEROTH, P., and GRÉEN, K. Early pregnancy interruption by 15(S)15-methyl prostaglandin $F_{2\alpha}$ methyl ester. Obstetrics and Gynecology 48(2): 221-224. August 1976.

73. BYGDEMAN, M. and SAMUELSSON, B. Quantitative determination of prostaglandins in human semen. Clinica Chimica Acta 10: 566-568. 1964.

*74. BYGDEMAN, M. and WIQVIST, N. Induction of abortion by different prostaglandin analogues. Acta Obstetricia et Gynecologica Scandinavica (Suppl. 37): 67-72. 1975.

*75. CALDER, A.A., EMBREY, M.P., and TAIT, T. Ripening of the cervix with extra-amniotic prostaglandin E_2 in viscous gel before induction of labour. British Journal of Obstetrics and Gynaecology 84(4): 264-268. April 1977.

76. CARSTEN, M.E. How does calcium control uterine contraction? Contemporary Ob/Gyn 7(7): 61-67. July 1976.

77. CARSTEN, M.E. and MILLER, J.D. Effects of prostaglandins and oxytocin on calcium release from a uterine microsomal fraction. Journal of Biological Chemistry 252(5): 1576-1581. March 10, 1977.

78. CARSTEN, M.E. and MILLER, J.D. Prostaglandin (PG) specific binding to several microsomal fractions from bovine myometrium.

Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. 12 p. (To be published by Raven Press)

79. CATES, W., Jr. Late effects of induced abortion: hypothesis or knowledge? Journal of Reproductive Medicine 22(4): 207-212. April 1979.

80. CATES, W., Jr. Prostaglandin may be "too safe" for abortions. Journal of the American Medical Association 236(3): 247-249. July 19, 1976.

81. CATES, W., Jr. [Center for Disease Control] [Relative safety/risks of prostaglandins] Personal communication, September 7, 1979. 1 p.

*82. CATES, W., Jr. and GRIMES, D.A. Morbidity and mortality from second trimester abortion: a decade's perspective. Presented at the Conference on Second Trimester Abortion: Perspectives After a Decade of Experience, Chapel Hill, North Carolina, September 28, 1979. 21 p. (To be published by PSG Publishing Co.)

83. CATES, W., Jr., GRIMES, D.A., HABER, R.J., and TYLER, C.W., Jr. Abortion deaths associated with the use of prostaglandin $F_{2\alpha}$. American Journal of Obstetrics and Gynecology 127(3): 219-222. February 1, 1977.

*84. CATES, W., Jr., GRIMES, D.A., SCHULZ, K.F., ORY, H.W., and TYLER, C.W., Jr. World Health Organization studies of prostaglandins versus saline as abortifacients: a reappraisal. Obstetrics and Gynecology 52(4): 493-498. October 1978.

85. CATES, W., Jr., GRIMES, D.A., and SMITH, J.C. The risk of dying from legal abortion, United States, 1972-1975. International Journal of Gynaecology and Obstetrics 15(2): 172-176. September-October 1977.

*86. CATES, W., Jr., GRIMES, D.A., and TYLER, C.W., Jr. Safety of legal abortion. [Letter] Lancet 1(8161): 198-199. January 26, 1980.

87. CATES, W., Jr. and JORDAAN, H.V.F. Sudden collapse and death of women obtaining abortions induced with prostaglandin $F_{2\alpha}$. American Journal of Obstetrics and Gynecology 133(4): 398-400. February 15, 1979.

88. CATES, W., Jr., SCHULZ, K.F., GRIMES, D.A., and TYLER, C.W., Jr. The effect of delay and method choice on the risk of abortion morbidity. Family Planning Perspectives 9(6): 266-273. November-December 1977.

89. CATES, W., Jr. and TIETZE, C. Standardized mortality rate associated with legal abortion: United States, 1972-1975. Family Planning Perspectives 10(2): 109-112. March-April 1978.

90. CHAKRAVARTY, N. The occurrence of a lipid-soluble smooth-muscle stimulating principle (SRS) in anaphylactic reaction. Acta Physiologica Scandinavica 48: 167-177. 1960.

91. CHALLIS, J.R.G. Physiology and pharmacology of PGs in parturition. Population Reports, Series G, No. 5. Population Information Program, July 1974. 12 p.

92. CHAN, W.Y. and DAWOOD, M.Y. Prostaglandin levels in menstrual fluid of non-dysmenorrheic and of dysmenorrheic subjects with and without oral contraceptive or ibuprofen therapy. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. 10 p. (To be published by Raven Press)

93. CHAN, W.Y., DAWOOD, M.Y., and FUCHS, F. Relief of dysmenorrhea with the prostaglandin synthetase inhibitor ibuprofen: effect on prostaglandin levels in menstrual fluid. American Journal of Obstetrics and Gynecology 135(1): 102-108. September 1, 1979.

94. CHANNING, C.P. Effects of prostaglandin inhibitors 7-oxa-13-prostynoic acid and eicosa-5,8,11,14-tetraynoic acid upon luteinization of rhesus monkey granulosa cells in culture. Prostaglandins 2(5): 351-367. November 1972.

95. CHATTERJEE, T.K., GRECH, E.S., and NILES, L. Preoperative cervical dilatation with 15(S)15-methyl $PGF_{2\alpha}$ methyl ester pessaries. International Journal of Gynaecology and Obstetrics 15(5): 423-427. 1978.

96. CHENG, M.C.E., KARIM, S.M.M., and RATNAM, S.S. Preoperative cervical dilatation with 15 (S) 15 methyl prostaglandin E_2 methyl ester in first trimester nulliparae: a double blind study. Contraception 12(1): 59-67. July 1975.

97. COLLIER, J.G. and FLOWER, R.J. Effect of aspirin on human seminal prostaglandins. Lancet 2: 852-853. October 16, 1971.

98. CONRAD, J.T. and UELAND, K. In vitro reduction of the stretch modulus of human cervical tissue by the prostaglandins, PGE_2 and $PGF_{2\alpha}$. [Abstract] Gynecologic Investigation 8(1-2): 112. 1977.

99. CONRAD, J.T. and UELAND, K. The stretch modulus of human cervical tissue in spontaneous, oxytocin-induced, and prostaglandin E_2-induced labor. American Journal of Obstetrics and Gynecology 133(1): 11-14. January 1, 1979.

100. CONTE, D., LAGUZZI, G., BONIFORTI, B., CANTAFORA, A., DI SILVERIO, F., LATINO, C., LALLONI, G., MESOLELLA, V., and ISIDORI, A. Prostaglandin content and metabolic activity of the human prostate. Presented at the International Symposium on Prostaglandins and Reproductive Physiology, Montpellier, France, September 17-18, 1979. 21 p.

101. COREY, E.J., ANDERSEN, N.H., CARLSON, R.M., PAUST, J., VEDEJS, E., VLATTAS, I., and WINTER, E.K. Total synthesis of prostaglandins. Synthesis of the pure dl-E_1, -$F_{1\alpha}$, -$F_{1\beta}$, -A_1 and -B_1 hormones. Journal of the American Chemical Society 90: 3245-3247. 1968.

102. CORNETTE, J.C., BEUVING, D.C., and KIRTON, K.T. Measurement of (15S)-15-methyl prostaglandin $F_{2\alpha}$ by radioimmunoassay. Prostaglandins 12(Suppl.): 53-62. 1976.

103. CORSON, S.L. and BOLOGNESE, R.J. Abortion of early pregnancy on an outpatient basis using Silastic 15(S)-15-methyl prostaglandin $F_{2\alpha}$ vaginal devices. Fertility and Sterility 28(10): 1056-1062. October 1977.

104. CORSON, S.L. and BOLOGNESE, R.J. Ibuprofen therapy for dysmenorrhea. Journal of Reproductive Medicine 20(5): 246-252. May 1978.

105. CORSON, S.L. and BOLOGNESE, R.J. Use of intramuscular 15(S)-15-methyl prostaglandin $F_{2\alpha}$ in failed abortions. American Journal of Obstetrics and Gynecology 133(2): 145-148. January 15, 1978.

106. CORSON, S.L., BOLOGNESE, R.J., and MEROLA, J. Intra-amniotic prostaglandin $F_{2\alpha}$ to induce midtrimester abortion. American Journal of Obstetrics and Gynecology 117(1): 27-34. September 1, 1973.

107. COUDERT, S.P., WINTER, J.S.D., and FAIMAN, C. Transient decline in serum progesterone levels during prostaglandin $F_{2\alpha}$ infusion in the midluteal phase of the normal human menstrual cycle. American Journal of Obstetrics and Gynecology 119(6): 755-761. July 15, 1974.

108. COUTINHO, E.M. and DARZÉ, E. Spontaneous contractility and the response of the human uterine cervix to prostaglandins $F_{2\alpha}$ and E_2 during the menstrual cycle. American Journal of Obstetrics and Gynecology 126(2): 224-225. September 15, 1976.

109. CRAFT, I. Intra-amniotic prostaglandins and urea for abortion. [Letter] Lancet 2(7822): 207. July 28, 1973.

110. CSAPO, A.I. "Prostaglandin impact" for menstrual induction. Population Reports, Series G, No. 4. Population Information Program, March 1974. 12 p.

111. CSAPO, A.I. [St. Louis University] [Sulprostone in early first trimester abortion] Personal communication, January 12, 1980.

112. CSAPO, A.I., PESKIN, E.G., SAUVAGE, J.P., PULKKINEN, M.O., LAMPE, L., CODENY, S., LAAJOKI, V., and KIVIKOSKI, A. Menstrual induction in preference to abortion. [Letter] Lancet 1(8159): 90-91. January 12, 1980.

113. CSAPO, A.I. and PULKKINEN, M. Indispensability of the human corpus luteum in the maintenance of early pregnancy luteectomy evidence. Obstetrical and Gynecological Survey 33(2): 69-81. February 1978.

*114. CSAPO, A.I. and PULKKINEN, M.O. The mechanism of prostaglandin action on the early pregnant human uterus. Prostaglandins 18(3): 479-490. September 1979.

115. CSAPO, A.I. and PULKKINEN, M.O. The mechanism of prostaglandin action on the pregnant human uterus. Prostaglandins 17(2): 283-299. February 1979.

116. CSAPO, A.I., PULKKINEN, M.O., and HENZL, M.R. The effect of naproxen-sodium on the intra-uterine pressure and menstrual pain of dysmenorrheic patients. Prostaglandins 13(1): 193-199. January 1977.

117. CSAPO, A.I., PULKKINEN, M.O., and WIEST, W.G. Effects of luteectomy and progesterone replacement therapy in early pregnant patients. American Journal of Obstetrics and Gynecology 115(6): 759-765. March 15, 1973.

118. DAMARAWY, H. and TOPPOZADA, M. Control of bleeding due to IUDs by a prostaglandin biosynthesis inhibitor. IRCS Medical Science 4: 5. 1976.

119. DANDENELL, L.-O., LALOS, O., LISCIAK, J., SANDSTROM, B., BARANY, S., and NILSSON, B. Clinical experience of naproxen in the treatment of primary dysmenorrhea. Acta Obstetricia et Gynecologica Scandinavica (Suppl. 87): 95-100. 1979.

120. DANFORTH, D.N., VEIS, A., BREEN, M., WEINSTEIN, H.G., BUCKINGHAM, J.C., and MANALO, P. The effect of pregnancy and labor on the human cervix: changes in collagen, glycoproteins, and glycosaminoglycans. American Journal of Obstetrics and Gynecology 120(5): 641-651. November 1, 1974.

121. DEMERS, L., BEHRMAN, H.R., and GREEP, R.O. Effects of prostaglandins and gonadotrophins on luteal prostaglandin and steroid biosynthesis. Advances in Bioscience 9: 701-707. 1972.

122. DENNEMARK, N. and SEMRAU, J. Intramuscular administration of sulprostone for the induction of abortion in intact pregnancy in the first trimester. In: Schering AG. International Sulprostone Symposium, Vienna, 1978: scientific papers. Groton, Connecticut, Pfizer, Inc., [1978] (Paper 29) 6 p.

123. DESHMUKH, K.K., ANJENEYELU, R., and MUJUMDAR, S.B. Mortality associated with induced abortion. Journal of Obstetrics and Gynaecology of India 29(2): 269-273. April 1979.

124. DESHMUKH, M.A., MOTASHAW, N.D., VAIDYA, P.R., and KULKARNI, A.P. Increasing morbidity and mortality in midtrimester abortions. [1978]. 11 p. (Unpublished)

125. DILLON, T.F., MOOTABAR, H., PHILLIPS, L.L., and RISK, A. The efficacy of intravaginal 15 methyl prostaglandin $F_{2\alpha}$ methyl ester in first and second trimester abortion. Prostaglandins 12(Suppl.): 81-98. 1976.

126. DINGFELDER, J.R. and BRENNER, W.E. The thermogenic activity of exogenous E and F prostaglandins in humans. Acta Obstetricia et Gynecologica Scandinavica 57(1): 35-40. 1978.

127. DINGFELDER, J.R., BRENNER, W.E., HENDRICKS, C.H., and STAUROVSKY, L.G. Reduction of cervical resistance by prostaglandin suppositories prior to dilatation for induced abortion. American Journal of Obstetrics and Gynecology 122(1): 25-30. May 1, 1975.

128. DINGFELDER, J.R. and STAUROVSKY, L.G. Ibuprofen for relief of dysmenorrhea. Presented at the District 4 Meeting of the American College of Obstetricians and Gynecologists, St. Maarten, Netherlands Antilles, October 22-29, 1977. 16 p.

129. DIPPEL, A.L. Death of foetus in utero. Bulletin of the Johns Hopkins Hospital 54(1): 24-47. January 1934.

130. DOWNIE, J., POYSER, N.L., and WUNDERLICH, M. Levels of prostaglandins in human endometrium during the normal menstrual cycle. Journal of Physiology 236(2): 465-472. 1974.

131. DUENHOELTER, J.H. and GANT, N.F. Complications following prostaglandin $F_{2\alpha}$-induced midtrimester abortion. Obstetrics and Gynecology 46(3): 247-250. September 1975.

132. DUENHOELTER, J.H., GANT, N.F., and JIMENEZ, J.M. Concurrent use of prostaglandin $F_{2\alpha}$ and laminaria tents for induction of midtrimester abortion. Obstetrics and Gynecology 47(4): 469-472. April 1976.

133. DUENHOELTER, J.H. and SANTOS-RAMOS, R. First experiences with a (15S)-15-methyl prostaglandin $F_{2\alpha}$ device for termination of early pregnancy first trimester with serial sonographic observations. Prostaglandins 12(Suppl.): 135-146. 1976.

*134. DUTT, T.P., BLAIR, M., and ELDER, M.G. Ultrasonic assessment of uterine emptying in first-trimester abortions induced by intravaginal 15-methyl prostaglandin $F_{2\alpha}$ methyl ester. American Journal of Obstetrics and Gynecology 133(5): 484-488. March 1, 1979.

135. DUTTA, S., DAS GUPTA, P.K., and SARKAR, B.B. Coagulation defects following termination of midtrimester pregnancy by intra-amniotic prostaglandin: a case report. Journal of Obstetrics and Gynaecology of India 29(2): 283-284. April 1979.

136. EDELMAN, D.A. Clinical evaluation of menstrual regulation. In: Holtrop, H.R., Waife, R.S., Bustamante, W., and Rizo, A., eds. New developments in fertility regulation. Boston, The Pathfinder Fund, 1976. p. 37-43.

137. EDELMAN, D.A., BRENNER, W.E., and BERGER, G. The relative risks of abortion by suction curettage and dilatation and curettage. Presented at the 101st annual meeting of the American Public Health Association, San Francisco, California, November 4-8, 1973.

138. EDELMAN, D.A., BRENNER, W.E., MEHTA, A.C., PHILIPS, F.S., BHATT, R.V., and BHIWANDIWALA, P. A comparative study of intra-amniotic saline and two prostaglandin $F_{2\alpha}$ dose schedules for midtrimester abortion. American Journal of Obstetrics and Gynecology 125(2): 188-195. May 15, 1976.

139. ELDER, M.G. Uterine action after induction of labour with oral prostaglandin E_2 tablets compared with intravenous oxytocin. British Journal of Obstetrics and Gynaecology 82(8): 674-681. August 1975.

140. ELDER, M.G. and STONE, M. Induction of labour by low amniotomy and oral administration of a solution compared to a tablet of prostaglandin E_2. Prostaglandins 6(5): 427-432. June 10, 1974.

141. ELDER, M.G. and STONE, M. Induction of labour using oral prostaglandin E_2 tablets. Journal of International Medical Research 4(5): 300-303. 1975.

142. ELGER, W., HASAN, S.H., HUMPEL, M., SKUBALLA, W., RADUCHEL, B., and VORBRUGGEN, H. The antifertile effects of sulprostone and other prostaglandins and their mechanism of action: a comparative study in several mammalian species. In: Schering AG. International Sulprostone Symposium, Vienna, 1978: scientific papers. Groton, Connecticut, Pfizer, Inc. [1978]. (Paper 4) 10 p.

143. ELIAS, J.A., NEWTON, J.R., and COLLINS, W.P. Changes in ovarian and pituitary function in non-pregnant women during the infusion of prostaglandin $F_{2\alpha}$. Acta Endocrinologica 80(4): 676-685. September-December 1975.

144. ELIASSON, R. Studies on prostaglandin: occurrence, formation and biological actions. Acta Physiologica Scandinavica 45(Suppl. 158): 1-73. 1959.

145. ELIASSON, R. and POSSE, N. The effect of prostaglandin on the nonpregnant human uterus in vivo. Acta Obstetricia et Gynecologica Scandinavica 39: 112-126. 1960.

146. ELLWOOD, D.A., MITCHELL, M.D., ANDERSON, B.M., and TURNBULL, A.C. A significant increase in the in-vitro production of prostaglandin E by ovine cervical tissue at delivery. Journal of Endocrinology 81(2): 133P-134P. May 1979.

147. EMBREY, M.P. Induction of labour with prostaglandins E_1 and E_2. British Medical Journal 2(5704): 256-258. May 2, 1970.

148. EMBREY, M.P. The prostaglandins in human reproduction: clinical applications. New York, Churchill Livingstone, 1975. 96 p.

149. EMERY, S., JARVIS, G.J., and JOHNSON, D.A.N. Uterine rupture after intra-amniotic injection of prostaglandin E_2. [Letter] British Medical Journal 2(6181): 51. July 7, 1979.

150. FIELDING, W.L., LEE, S.-Y., and FRIEDMAN, E.A. Continued pregnancy after failed first trimester abortion. Obstetrics and Gynecology 52(1): 56-58. July 1978.

151. FOGH, M. [Georgetown University] [Induction of labor in Scandinavian countries] Personal communication, February 6, 1980.

152. FRIEDMAN, E.A. and SACHTLEBEN, M.R. Effect of oxytocin and oral prostaglandin E_2 on uterine contractility and fetal heart rate patterns. American Journal of Obstetrics and Gynecology 130(4): 403-407. February 15, 1978.

153. FUSELIER, P.G. and WITTCOFF, H. Induction of labor with PGE_2 vagina suppositories. Journal of the Louisiana State Medical Society 129(7): 175-177. July 1977.

154. FYLLING, P. and JERVE, F. 15(S)15-methyl prostaglandin $F_{2\alpha}$ for termination of very early human pregnancy: a comparative study of a single intramuscular injection and vaginal suppositories. Prostaglandins 14(4): 785-790. October 1977.

155. GANGULI, A.C., GRÉEN, K., and BYGDEMAN, M. Preoperative dilatation of the cervix by single vaginal administration of 15-methyl-$PGF_{2\alpha}$ methyl ester. Prostaglandins 14(4): 779-784. October 1977.

156. GANGULI, A.C., KRISHNA, U.R., RAOTE, V.B., and PURANDARE, V.N. Prostaglandin suppositories in first trimester termination of pregnancy. Clinician 42(11): 400-404. November 1978.

157. GERAIS, A.-S., ABDEL-AZIZ, F., and ABDEL-HAFIZ, A.-R. Inducing labor with oral prostaglandin E_2 in Khartoum hospital. International Journal of Gynaecology and Obstetrics 15(6): 530-531. May-June 1978.

158. GHARSE, R.M., KRISHNA, U.R., GANGULI, A.C., and PURANDARE, V.N. Serial intramuscular injections of 15 methyl $PGF_{2\alpha}$ for second trimester abortions. Journal of Postgraduate Medicine 23(2): 91-94. April 1977.

159. GHOUSE, N., PHILLIPS, F., and PACHAURI, S. A comparison of the safety and effectiveness of prostaglandin, intraamniotic saline and hysterotomy for second trimester pregnancy termination. In: Pachauri, S., ed. Fourth Transaction of Scientific Papers at the India FRP Contributors' Conference, Bombay, [India], February 24, 1977. Calcutta, India, India Fertility Research Programme, September 1977. p. 73-81.

160. GOLBUS, M.S. Laminaria and intra-amniotic prostaglandin $F_{2\alpha}$ for induction of mid-trimester abortions. American Journal of Obstetrics and Gynecology 119(4): 569-571. June 15, 1974.

161. GOLBUS, M.S. and CREASY, R.K. Uterine priming with oral prostaglandin E_2 prior to elective induction with oxytocin. Prostaglandins 14(3): 577-581. September 1977.

162. GOLD, J. Complications of different means for cervical dilatation: the JPSA/CDC experience. Presented at the Conference on Cervical Dilatation, Val Morin, Quebec, August 18, 1978.

163. GOLDBLATT, M.W. A depressor substance in seminal fluid. Journal of the Society for Chemical Industries (London) 52: 1056-1057. 1933.

164. GOLDBLATT, M.W. Properties of human seminal plasma. Journal of Physiology (London) 84: 208-218. 1935.

165. GORDON, D., MYATT, L., GORDON-WRIGHT, A., HANSON, J., and ELDER, M.G. Radioimmunoassay of 15-oxo-prostaglandin E_2 in peripheral plasma after oral administration of prostaglandin E_2 tablets used for induction of labor. Prostaglandins 13(3): 399-408. March 1977.

166. GORDON, H. and PIPE, N.G.J. Induction of labor after intra-uterine fetal death: a comparison between prostaglandin E_2 and oxytocin. Obstetrics and Gynecology 45(1): 44-46. January 1975.

*167. GODRON-WRIGHT, A.P., DUTT, T.P., and ELDER, M.G. The routine use of oral prostaglandin E_2 tablets for induction or augmentation of labour. Acta Obstetricia et Gynecologica Scandinavica 58(1): 23-26. 1979.

168. GORDON-WRIGHT, A.P. and ELDER, M.G. Prostaglandin E_2 tablets used intravaginally for the induction of labour. British Journal of Obstetrics and Gynaecology 86(1): 32-36. January 1979.

169. GORDON-WRIGHT, A.P. and ELDER, M.G. The systemic absorption from the vagina of prostaglandin E_2 administered for the induction of labour. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. 8 p. (To be published by Raven Press)

*170. GRANSTROM, E. Minireview: radioimmunoassay of prostaglandins. Prostaglandins 15(1): 3-17. January 1978

171. GREEN, K. Gas chromatography-mass spectrometry of O-methyloxime derivatives of prostaglandins. Chemistry and Physics of Lipids 3: 254-272. September 1969.

172. GRÉEN, K. and BYGDEMAN, M. Plasma levels of 15(S)15-methyl $PGF_{2\alpha}$ following administration via various routes for induction of abortion. Prostaglandins 14(5): 1013-1024. November 1977.

173. GRÉEN, K., BYGDEMAN, M., and BREMME, K. Interruption of early first trimester pregnancy by single vaginal administration of 15-methyl-$PGF_{2\alpha}$-methyl ester. Contraception 18(6): 551-560. December 1978.

*174. GRÉEN, K. and SVANBORG, K. On the mechanism of action of 15-methyl-$PGF_{2\alpha}$ as an abortifacient. Prostaglandins 17(2): 277-282. February 1979.

*175. GRIMES, D.A. and CATES, W., Jr. The comparative efficacy and safety of intraamniotic prostaglandin $F_{2\alpha}$ and hypertonic saline for second-trimester abortion: a review and critique. Journal of Reproductive Medicine 22(5): 248-254. May 1979.

*176. GRIMES, D.A. and CATES, W., Jr. Complications from legally-induced abortion: a review. Obstetrical and Gynecological Survey 34(3): 177-191. March 1979.

177. GRIMES, D.A. and CATES, W., Jr. Gestational age limit of twelve weeks for abortion by curettage. American Journal of Obstetrics and Gynecology 132(2): 207-210. September 15, 1978.

178. GRIMES, D.A., HULKA, J.F., and McCUTCHEN, M.E. Midtrimester abortion by dilatation and evacuation versus intraamniotic instillation of prostaglandin $F_{2\alpha}$: a randomized clinical trial. American Journal of Obstetrics and Gynecology. In press.

179. GRIMES, D.A., SCHULZ, K.F., CATES, W., Jr., and TYLER, C.W., Jr. Local versus general anesthesia: which is safer for performing suction curettage abortions? American Journal of Obstetrics and Gynecology 135(8): 1030-1035. December 15, 1979.

180. GRIMES, D.A., SCHULZ, K.F., CATES, W., Jr., and TYLER, C.W., Jr. Midtrimester abortion by dilatation and evacuation: a safe and practical alternative. New England Journal of Medicine 296(20): 1141-1145. May 19, 1977.

181. GRIMES, D.A., SCHULZ, K.F., CATES, W., Jr., and TYLER, C.W., Jr. Midtrimester abortion by intraamniotic prostaglandin $F_{2\alpha}$: safer than saline? Obstetrics and Gynecology 49(5): 612-616. May 1977.

182. GUBNER, R.S. Abortions are eased with new PG drug. Medical Tribune 20(1): 1, 6. January 3, 1979.

183. HALE, R.W. and PION, R.J. Laminaria: an underutilized clinical adjunct. Clinical Obstetrics and Gynecology 15(3): 829-850. September 1972.

184. HALLBERG, L. and NILSSON, L. Determination of menstrual blood loss. Scandinavian Journal of Clinical and Laboratory Investigation 16(2): 244-248. 1964.

185. HAMANN, G.O. and LAURSEN, B. Primaer dysmenore behandlet med indometacin. [Primary dysmenorrhea treated with indomethacin.] [DA] Ugeskrift for Laeger 139(32): 1899-1901. August 8, 1977.

186. HAMBERGER, L., NILSSON, L., BIÖRN-RASMUSSEN, E., ATTERFELT, P., and WIQVIST, N. Early abortion by vaginal prostaglandin suppositories: blood loss in relation to elimination of serum chorionic gonadotrophin, progesterone and estradiol-17β. Contraception 17(2): 183-194. February 1978.

187. HAMBERGER, L., NILSSON, L., DENNEFORS, B., KHAN, I., and SJÖGREN, A. Cyclic AMP formation of isolated human corpora lutea in response to HCG: interference by $PGF_{2\alpha}$. Prostaglandins 17(4): 615-621. April 1979.

188. HANSON, F.W., IZU, A., and HENZL, M.R. Naproxen sodium in dysmenorrhea: its influence in allowing continuation of work/school activities. Obstetrics and Gynecology 52(5): 583-587. November 1978.

189. HARLAP, S., SHIONO, P.H., RAMCHARAN, S., BERENDES, H., and PELLEGRIN, F. A prospective study of spontaneous fetal losses after induced abortions. New England Journal of Medicine 301(13): 677-681. September 27, 1979.

190. HAUTH, J.C., CUNNINGHAM, F.G., and WHALLEY, P.J. Early labor initiation with oral PGE_2 after premature rupture of the membranes at term. Obstetrics and Gynecology 49(5): 523-526. May 1977.

191. HENDERSON, K.M. and McNATTY, K.D. A possible interrelationship between gonadotrophin stimulation and prostaglandin $F_{2\alpha}$ inhibition of steroidogenesis by granulosa luteal cells in vitro. Journal of Endocrinology 73(1): 71-78. April 1977.

192. HENDRICKS, C.H., DINGFELDER, J.R., and GRUBER, W.S. Clinical observations with a prostaglandin-containing Silastic vaginal device for pregnancy termination. Prostaglandins 12(Suppl.): 99-122. 1976.

193. HENRIQUES, E.S., ETKIN, R.H., LEE, J.D., and SWARTZ, D.P. Intramuscular prostaglandin (15S)-15-methyl $PGF_{2\alpha}$ (tham) in midtrimester abortion. Prostaglandins 13(1): 183-191. January 1977.

194. HENZL, M.R. and IZU, A. Naproxen and naproxen sodium in dysmenorrhea: development from in vitro inhibition of prostaglandin synthesis to demonstration of clinical efficacy. Acta Obstetricia et Gynecologica Scandinavica (Suppl. 87): 105-117. 1979.

195. HENZL, M.R., ORTEGA, E., CORTES-GALLEGOS, V., TOMLINSON, R.V., and SEGRE, E.J. Prostaglandin E_2 and the luteal phase of the menstrual cycle: effects on blood progesterone, estradiol, cortisol and growth hormone levels. Journal of Clinical Endocrinology and Metabolism 36(4): 784-787. 1973.

196. HENZL, M.R., ORTEGA-HERRERA, E., RODRIGUEZ, C., and IZU, A. Anaprox in dysmenorrhea: reduction of pain and intrauterine pressure. American Journal of Obstetrics and Gynecology 135(4): 455-460. October 15, 1979.

197. HESS, H.J., BINDRA, J.S., CONSTANTINE, J.W., ELGER, W., LOGE, O., SCHILLINGER, E., and LOSERT, W. A tissue-selective prostaglandin E_2 analog with potent antifertility effects. Experientia 33(8): 1076-1077. August 15, 1977.

198. HILLIER, K. and WALLIS, R. Arachidonic acid and the human cervix. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. 1 p. (To be published by Raven Press)

199. HINGORANI, V. $PGF_{2\alpha}$ and 15-Me-$PGF_{2\alpha}$ as an abortifacient: 7 years experience. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. 12 p. (To be published by Raven Press)

200. HODGSON, J.E. Three hundred late midtrimester abortions induced by extraamniotic $PGF_{2\alpha}$ and intracervical laminaria tents. Advances in Planned Parenthood 14(2): 61-67. 1979.

201. HOGUE, C.J.R. Review of postulated fertility complication subsequent to pregnancy termination. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Risks, benefits, and controversies in fertility control. Hagerstown, Maryland, Harper & Row, 1978. p. 356-367.

202. HOROWITZ, A.J. Midtrimester abortion utilizing intraamniotic prostaglandin $F_{2\alpha}$, laminaria and oxytocin. Journal of Reproductive Medicine 21(4): 236-240. October 1978.

203. HORTON, E.W. and POYSER, N.L. Uterine luteolytic hormone: a physiological role for prostaglandin $F_{2\alpha}$. Physiological Reviews 56(4): 595-651. October 1976.

204. HULKA, J. Tears of internal cervical os during dilatation for routine curettage. American Journal of Obstetrics and Gynecology 82(4): 913-919. October 1961.

205. ISKANDER, M.N. A comparison of the efficacy and safety of extra-amniotic prostaglandin E_2 and intravenous prostaglandin E_2 for the induction of labour in patients with unripe cervices. Journal of International Medical Research 6(2): 144-146. 1978.

206. JAGANNATHA, K.T., PURI, C.P., KINRA, G., AGARWAL, N., JAIN, A.K., RAHMAN, S.A., LAUMAS, K.R., and HINGORANI, V. Clinical and hormonal studies with 3 mg 15(S)15-methyl-$PGF_{2\alpha}$ methyl ester long-acting single vaginal suppository. Contraception 17(3): 267-282. March 1978.

207. JANBU, T., LØKKEN, P., NESHEIM, B.-I. Effect of acetylsalycilic acid, paracetamol, placebo on pain and blood loss in dysmenorrheic women. European Journal of Clinical Pharmacology 14(6): 413-416. December 18, 1978.

208. JANBU, T., LØKKEN, P., and NESHEIM, B.-I. Effect of acetylsalycilic acid, paracetamol and placebo on pain and blood loss in dysmenorrheic women. Acta Obstetricia et Gynecologica Scandinavica (Suppl. 87): 81-85. 1979.

209. JANSON, P.O., ALBRECHT, I., and AHREN, K. Effects of prostaglandin $F_{2\alpha}$ on ovarian blood flow and vascular resistance in the pseudopregnant rabbit. Acta Endocrinologica 79(2): 337-350. June 1975.

210. JERVE, F. and FYLLING, P. Therapeutic abortion in late first trimester: prostaglandin pretreatment compared with primary surgery. Prostaglandins and Medicine 1(4): 333-337. October 1978.

211. JEWELEWICZ, R., CANTOR, B., DYRENFURTH, I., WARREN, M.P., and VANDE WIELE, R.L. Intravenous infusion of prostaglandin $F_{2\alpha}$ in mid-luteal phase of the normal human menstrual cycle. Prostaglandins 1(6): 443-451. June 1972.

212. JONES, G.S. and WENTZ, A.C. The effect of prostaglandin $F_{2\alpha}$ infusion on corpus luteum function. American Journal of Obstetrics and Gynecology 114(3): 393-404. October 1, 1972.

213. JONSSON, H.T., MIDDLEDITCH, B.S., and DESIDERIO, D.M. Prostaglandins in human seminal fluid: two novel compounds. Science 187(4181): 1093-1094. March 21, 1975.

214. KAJANOJA, P., RANTA, T., and SEPPALA, M. Effect of prostaglandin $F_{2\alpha}$ on ovarian and pituitary function in the mid-luteal phase. Prostaglandins 16(2): 327-332. August 1978.

215. KAJANOJA, P. and VESANTO, T. Naproxen and indomethacin in the treatment of primary dysmenorrhea. Acta Obstetricia et Gynecologica Scandinavica (Suppl. 87): 87-89. 1979.

216. KALTREIDER, N.B., GOLDSMITH, S., and MARGOLIS, A.J. The impact of midtrimester abortion techniques on patients and staff. American Journal of Obstetrics and Gynecology 135(2): 235-238. September 15, 1979.

217. KAPADIA, L. and ELDER, M.G. Flufenamic acid in treatment of primary spasmodic dysmenorrhoea. A double-blind crossover study. Lancet 1(8060): 348-350. February 18, 1978.

218. KARIM, S.M.M. Action of prostaglandin in the pregnant woman. Annals of the New York Academy of Sciences 180: 483-498. April 30, 1971.

219. KARIM, S.M.M. Appearance of prostaglandin $F_{2\alpha}$ in human blood during labour. British Medical Journal 4(5631): 618-621. December 7, 1968.

220. KARIM, S.M.M. Identification of prostaglandins in human amniotic fluid. Journal of Obstetrics and Gynecology of the British Commonwealth 73(6): 903-908. December 1966.

221. KARIM, S.M.M. The role of prostaglandin $F_{2\alpha}$ in parturition. In: Horton, E.W. and Mantegazza, P., eds. Prostaglandins, peptides, and amines. Symposium on Prostaglandins, Peptides, and Amines. London, Academic Press, 1969. p. 65.

222. KARIM, S.M.M., CHOO, H.T., and CHENG, P. Cervical dilatation with prostaglandin analogues prior to vaginal termination of first trimester pregnancy in nulliparous patients. Prostaglandins 9(4): 631-638. April 1975.

223. KARIM, S.M.M., CHOO, H.T., LIM, A.L., YEO, K.C., and RATNAM, S.S. Termination of second trimester pregnancy with intramuscular administration of 16 phenoxy-ω-17,18,19,20 tetranor PGE_2 methyl sulfonylamide. Prostaglandins 15(6): 1063-1068. June 1978.

224. KARIM, S.M.M., HILLIER, K., TRUSSELL, R.R., PATEL, R.C., and TAMUSANGE, S. Induction of labour with prostaglandin E_2. Journal of Obstetrics and Gynaecology of the British Commonwealth 77(3): 200-210. March 1970.

225. KARIM, S.M.M., ILANCHERAN, A., WUN, W., HO, T.H., and RATNAM, S.S. Intramuscular administration of 16 phenoxy-ω-17,18,19,20 tetranor PGE_2 methyl sulfonylamide for pre-operative cervical dilatation in first trimester nulliparae. Prostaglandins and Medicine 1(1): 71-75. July 1978.

226. KARIM, S.M.M., RAO, B., RATNAM, S.S., PRASAD, R.N.V., WONG, Y.M., and ILANCHERAN, A. Termination of early pregnancy (menstrual induction) with 16-phenoxy-ω-tetranor-PGE_2 methylsulfonylamide. Contraception 16(4): 377-381. October 1977.

227. KARIM, S.M.M., RATNAM, S.S., and ILANCHERAN, A. Menstrual induction with vaginal administration of 16, 16 dimethyl trans-Δ^2-PGE_1 methyl ester (ONO-802). Prostaglandins 14(3): 615-616. September 1977.

228. KARIM, S.M.M. and RATNAM, S.S. Termination of pregnancy with vaginal administration of 16, 16 dimethyl prostaglandin E_2 p-benzaldehyde semicarbazone ester. British Journal of Obstetrics and Gynaecology 84(2): 135-137. February 1977.

229. KARIM, S.M.M., RATNAM, S.S., PRASAD, R.N.V., and WONG, Y.M. Vaginal administration of a single dose of 16, 16 dimethyl prostaglandin E_2 p-benzaldehyde semicarbazone ester for pre-operative cervical dilatation of first trimester nulliparae. British Journal of Obstetrics and Gynaecology 84(4): 269-271. April 1977.

230. KARIM, S.M.M. and SHARMA, S.D. Oral administration of prostaglandin E_2 for the induction and acceleration of labor. Journal of Reproductive Medicine 9(6): 346-352. December 1972.

231. KARIM, S.M.M. and SHARMA, S.D. Termination of second trimester pregnancy with 15 methyl analogues and prostaglandins E_2 and $F_{2\alpha}$. Journal of Obstetrics and Gynaecology of the British Commonwealth 79(8): 737-743. August 1972.

232. KARIM, S.M.M., TRUSSELL, R.R., HILLIER, K., and PATEL, R.C. Induction of labour with prostaglandin $F_{2\alpha}$. Journal of Obstetrics and Gynaecology of the British Commonwealth 76(9): 769-782. September 1969.

233. KARIM, S.M.M., TRUSSELL, R.R., PATEL, R.C., and HILLIER, K. Response of pregnant human uterus to prostaglandin-$F_{2\alpha}$-induction of labour. British Medical Journal 4(5631): 621-623. December 1, 1968.

234. KAUPPILA, A., PUOLAKKA, J., and YLIKORKALA, O. Prostaglandin biosynthesis inhibitors and endometriosis. Prostaglandins 18(4): 655-661. October 1979.

235. KAUPPILA, A., POULAKKA, J., and YLIKORKALA, O. The relief of primary dysmenorrhea by ketoprofen and indomethacin. Prostaglandins 18(4): 647-653. October 1979.

236. KAUPPILA, A. and YLIKORKALA, O. Indomethacin and tolfenamic acid in primary dysmenorrhea. European Journal of Obstetrics, Gynecology and Reproductive Biology 7(2): 59-64. 1977.

237. KELLY, R.W., COOPER, I., and TEMPLETON, A.A. Reduced prostaglandin levels in the semen of men with very high sperm concentrations. Journal of Reproduction and Fertility 56(1): 195-199. May 1979.

238. KERENYI, T.D. [Mt. Hospital, New York, New York] [Sulprostone for early abortion; PGs for postpartum bleeding; current practice] Personal communication. January 22, 1980.

239. KERENYI, T.D. and DEN, T. Intraamniotic instillation of saline and prostaglandin for midtrimester abortion. In: Zatuchni, G.I., Sciarra, J.J., and Speidel, J.J., eds. Pregnancy termination: procedures, safety, and new developments. [Proceedings of the workshop, Nassau, Bahamas, May 23-26, 1978] Hagerstown, Maryland, Harper and Row, 1979. (PARFR Series on Fertility Regulation) p. 254-260.

240. KIMBALL, F.A., BUNDY, G.L., ROBERT, A., and WEEKS, J.R. Synthesis and biological properties of 9-deoxo-16,16-dimethyl-9-methylene-PGE_2. Prostaglandins 19(5): 657-666. May 1979.

241. KING, T.M., DUBIN, N.H., ATIENZA, M.F., BURKMAN, R.T., BLAKE, D.A., and BAROS, N.A. Intra-amniotic urea and prostaglandin $F_{2\alpha}$ for midtrimester abortion: clinical and laboratory evaluation. American Journal of Obstetrics and Gynecology 129(7): 817-824. December 1, 1977.

242. KINOSHITA, K., ENEROTH, P., and BYGDEMAN, M. Treatment with a single vaginal suppository containing 15-methyl $PGF_{2\alpha}$ methyl ester at expected time of menstruation. Prostaglandins 17(3): 469-481. March 1979.

243. KINRA, G., AGARWAL, N., JAGANNATH, K.T., and HINGORANI, V. Evaluation of a single dose schedule of 15(S)15 methyl $PGF_{2\alpha}$ methyl ester suppository for the termination of 10-14 weeks of pregnancy. Contraception 17(5): 455-464. May 1978.

244. KIRTON, K.T., CORNETTE, J.C., and BARR, K.L. Characterization of antibody of prostaglandin $F_{2\alpha}$. In: Bergstrom, S., Gréen, K., and Samuelsson, B. [Proceedings of the] 3rd conference on prostaglandins and fertility control, Stockholm, Sweden, January 17-20, 1972. Stockholm, Sweden, WHO Research and Training Centre on Human Reproduction, Karolinska Institutet, [1972]. (Prostaglandins in Fertility Control 2) p. 60-68.

245. KIRTON, K.T. and FORBES, A.D. Activity of 15(S) 15-methyl prostaglandin E_2 and $F_{2\alpha}$ as stimulants of uterine contractility. Prostaglandins 1(4): 319-325. April 1972.

246. KIRTON, K.T., KIMBALL, F.A., and PORTENA, S.E. Reproductive physiology: prostaglandin-associated events. In: Samuelsson, B. and Paoletti, R., eds. Advances in prostaglandin and thromboxane research. New York, Raven Press, 1976. p. 621-625.

247. KNABE, H. and LEHMANN, F. Abortinduktion mit Prostaglandin $F_{2\alpha}$. Zervixdilatation mit 3 mg Prostaglandin $F_{2\alpha}$-Gel im 1. Trimenon. Erfahrungsbericht nach 197 Abruptiones. [Induction of abortion with prostaglandin $F_{2\alpha}$: cervical dilatation with 3 mg prostaglandin $F_{2\alpha}$-gel in the first trimester: report of 197 terminations.] [GE] Fortschritte der Medizin 96(7): 360-362. February 16, 1978.

248. KORDA, A.R., SHUTT, D.A., SMITH, I.D., SHEARMAN, R.P., and LYNEHAM, R.C. Assessment of possible luteolytic effect of intra-ovarian injection of postaglandin $F_{2\alpha}$ in the human. Prostaglandins 9(3): 443-449. March 1975.

249. KORTEWEG, M. and VERDONK, G. PG levels during implantation, pregnancy, lactation, and restoration of ovulation: case report. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. 7 p. (To be published by Raven Press)

250. KOVASZNAY, B.M., BURKMAN, R.T., ATIENZA, M.F., and KING, T.M. Intravascular spill of hyperosmolar urea during induced midtrimester abortion. Obstetrics and Gynecology 53(1): 127-130. January 1979.

251. KIRSHNA, U.R., COMPANYWALA, R., ANANTHAKRISHNAN, R., and PURANDARE, V.N. Supplementary effect of prostaglandins in mid-trimester abortions by ethacridine lactate. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. 8 p. (To be published by Raven Press)

252. KRISHNA, U.R., MANDLEKAR, A.V., GANGULI, A.C., and RAOTE, V.B. Cervical dilatation in late first trimester termination by prostaglandin, hylase and isogel. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. 7 p. (To be published by Raven Press)

253. KRISHNA, U.R., MHATRE, V., GANGULI, A.C., and PURANDARE, V.N. Evaluation of 15(S)15-methyl-$PGF_{2\alpha}$-methyl ester vaginal suppositories for cervical dilatation and second trimester pregnancy termination. Contraception 14(6): 661-670. December 1976.

254. KRISHNA, U.R., RAOTE, V.B., GANGULI, A.C., GOGATE, S.G., NARVEKAR, M.R., and PURANDARE, V.N. A comparative study of ethacridine lactate and other agents used by the extraamniotic route for second trimester abortion. In: Pachauri, S., ed. Fourth transaction of scientific papers at the India FRP Contributors' Conference, Bombay, [India], February 24, 1977. Calcutta, India, India Fertility Research Programme, September 1977. p. 157-166.

255. KUHNLE, H., GRANDE, P., and KUHN, W. Vermeidung dilatationsbedingter Komplikationen beim Schwangerschaftsabbruch durch intrazervikale Applikation eines prostaglandinhaltigen Gels. [Preventing complications due to dilatation by intrauterine application of a prostaglandin gel.] [GE] Geburtshilfe and Frauenheilkunde 37(8): 675-680. August 1977.

256. KURZROK, R. and LIEB, C.C. Biochemical studies of human semen. 2. The action of semen on the human uterus. Proceedings of the Society for Experimental Biology and Medicine 28(3): 268-272. December 1930.

257. LABRUM, A.H., LIPKIN, M., Jr., and DRAY, F. Hyperprostaglandinemia: a previously unrecognized syndrome [Abstract]. In: Samuelsson, B. and Paoletti, R., eds. Advances in prostaglandin and thromboxane research. Vol. 2. New York, Raven Press, 1976. p. 888-889.

258. LACKRITZ, R., GIBSON, M., and FRIGOLETTO, F.D., Jr. Preinduction use of laminaria for the unripe cervix. American Journal of Obstetrics and Gynecology 134(3): 349-350. June 1, 1979.

259. LANGE, A.P. and SECHER, N.J. Midtrimester and missed abortion treated with intramuscular 15(S)-15 methyl $PGF_{2\alpha}$. Prostaglandins 14(2): 389-395. August 1977.

260. LAUERSEN, N.H. [Mt. Sinai Hospital, New York] [Early pregnancy interruption with two 15-Me-$PGF_{2\alpha}$ suppositories] Personal communication, January 1980.

261. LAUERSEN, N.H. [Mt. Sinai Hospital, New York, New York] [First trimester abortions]. Personal communication, February 6, 1980.

*262. LAUERSEN, N.H. Investigation of prostaglandins for abortion. Acta Obstetricia et Gynecologica Scandinavica (Suppl. 81): 1-36. 1979.

263. LAUERSEN, N.H. and CONRAD, P. Effect of oxytocic agents on blood loss during first trimester suction curettage. Obstetrics and Gynecology 44(3): 428-433. September 1974.

264. LAUERSEN, N.H., MACKENZIE, I.A., and EMBREY, M.P. Preinduction cervical priming with oral prostaglandin E_2. American Journal of Obstetrics and Gynecology 135(8): 1057-1061. December 15, 1979.

265. LAUERSEN, N.H., SECHER, N.J., and WILSON, K.H. Midtrimester abortion induced by serial intramuscular injections of 15(S)-15-methyl prostaglandin E_2 methyl ester. American Journal of Obstetrics and Gynecology 123(7): 665-670. December 1, 1975.

266. LAUERSEN, N.H., SEIDMAN, S., and WILSON, K.H. Cervical priming prior to first-trimester suction abortion with a single 15-methyl-prostaglandin $F_{2\alpha}$ vaginal suppository. American Journal of Obstetrics and Gynecology 135(8): 1116-1118. December 15, 1979.

267. LAUERSEN, N.H. and WILSON, K.H. The abortifacient and oxytocic effects of an intravaginal silicone rubber device containing a 0.5 per cent concentration of 15(S)-15-methyl prostaglandin $F_{2\alpha}$ methyl ester. American Journal of Obstetrics and Gynecology 127(7): 784-787. April 1, 1977.

268. LAUERSEN, N.H. and WILSON, K.H. The abortifacient effectiveness and plasma prostaglandin concentrations with 15(S)-15-methyl prostaglandin $F_{2\alpha}$ methyl ester-containing vaginal Silastic devices. Fertility and Sterility 27(12): 1366-1373. December 1976.

269. LAUERSEN, N.H. and WILSON, K.H. The abortifacient effects of a newly developed vaginal Silastic device impregnated with an 0.5% concentration of 15(S)-15-methyl-prostaglandin $F_{2\alpha}$ methyl ester in the first trimester. Contraception 13(6): 697-705. June 1976.

270. LAUERSEN, N.H. and WILSON, K.H. The effect of a 10 cm^2, 0.5% 15-Me-$PGF_{2\alpha}$ methyl ester intravaginal Silastic device on abortion and plasma prostaglandin concentration. Prostaglandins 13(4): 755-762. April 1977.

271. LAUERSEN, N.H. and WILSON, K.H. The effects of intramuscular injections of 15(S)-15-methyl prostaglandin $F_{2\alpha}$ in failed abortions. Fertility and Sterility 28(10): 1044-1047. October 1977.

272. LAUERSEN, N.H. and WILSON, K.H. Hormone release and abortifacient effectiveness of a newly developed Silastic device containing 15-Me-$PGF_{2\alpha}$ methyl ester in concentrations of 0.5% and 1.0%. Prostaglandins 12(Suppl.): 63-80. 1976.

273. LAUERSEN, N.H. and WILSON, K.H. Induction of labor with oral prostaglandin E_2. Obstetrics and Gynecology 44(6): 793-801. December 1974.

274. LAUERSEN, N.H. and WILSON, K.H. The role of a long acting vaginal suppository of 15-Me-$PGF_{2\alpha}$ in first and second trimester abortion: vaginal 15-Me-$PGF_{2\alpha}$ in abortion. [1979]. 13 p. (Unpublished)

275. LAUERSEN, N.H. and WILSON, K.H. Termination of midtrimester pregnancy by serial intramuscular injections of 15(S)-15-methyl prostaglandin $F_{2\alpha}$. American Journal of Obstetrics and Gynecology 124(2): 169-176. January 15, 1976.

276. LAUERSEN, N.H., WILSON, K.H., BELING, C.G., and FUCHS, F. Comparison of prostaglandin $F_{2\alpha}$ and hypertonic saline for induction of midtrimester abortion. American Journal of Obstetrics and Gynecology 120(7): 875-889. December 1, 1974.

277. LAYES MOLLA, A. and DONALD, J.F. A comparative study of ibuprofen and paracetamol in primary dysmenorrhoea. Journal of International Medical Research 2(6): 395-399. 1974.

278. LEADER, A., BYGDEMAN, M., CEKAN, S.Z., DICZFALUSY, E., GUERRERO, R., MARTIN, J.N., Jr., and WIQVIST, N. Prostaglandins and post-abortion luteolysis in early pregnancy. Prostaglandins 10(5): 889-897. November 1975.

279. LEE, W.K. and BAGGISH, M.S. Live birth as a complication of second trimester abortion induced with intra-amniotic prostaglandin $F_{2\alpha}$. Advances in Planned Parenthood 13: 7-15. 1978.

280. LEHMANN, F.F. Induction of mid-trimester abortion with a new prostaglandin analogue (SH B 286). In: Schering AG. International Sulprostone Symposium, Vienna, 1978: scientific papers. Groton, Connecticut, Pfizer, Inc., [1978]. (Paper 30) 3 p.

281. LEHMANN, F.F., PETERS, F., BRECKWOLDT, M., and BETTENDORF, G. Luteolysis after infusion of prostaglandin $F_{2\alpha}$ in man. [Abstract] Fourth International Congress of Endocrinology, Washington, D.C., June 18-24, 1972. Amsterdam, Netherlands, Excerpta Medica, 1972. (International Congress Series 256) p. 189-190.

282. LEMAIRE, W.J. and SHAPIRO, A.G. Prostaglandin $F_{2\alpha}$: its effect on the corpus luteum of the menstrual cycle. Prostaglandins 1(4): 259-267. April 1972.

283. LEVINE, L., CERNOSEK, R.M.G., POLET, H., and GERSHMAN, H. Prostaglandins: serologic specificities and estimation in biological fluids. In: Bergström, S., Green, K., and Samuelsson, B., eds. [Proceedings of the] 3rd conference on prostaglandins in fertility control, Stockholm, Sweden, January 17-20, 1972. Stockholm, Sweden, WHO Research and Training Centre on Human Reproduction, Karolinska Institutet, [1972]. (Prostaglandins in Fertility Control 2) p. 107-108.

284. LEVINE, L. and VUNAKIS, H. VAN. Antigenic activity of prostaglandins. Biochemical and Biophysical Research Communications 41(5): 1171-1177. 1970.

285. LEWY, R.I. [Thomas Jefferson University Medical School, Philadelphia, Pennsylvania] [19-hydroxy-prostaglandins] Personal communication, May 30, 1979. 1 p.

286. LEWY, R.I., BILLS, T.K., DALTON, J., SMITH, J.B., and SILVER, M.J. 19-hydroxy-prostaglandin E and male infertility. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. (To be published by Raven Press)

287. LICHTENEGGER, W. Abortinduktion mit Prostaglandin $F_{2\alpha}$ und einem neuen Prostaglandin-E_2-Derivat. [Abortion induction with prostaglandin $F_{2\alpha}$ and a new prostaglandin E_2 derivative.] [GE] Weiner Medizinische Wochenschrift 127(17): 536-538. September 30, 1977.

288. LICHTENEGGER, P., SCHRODL, P., and WEISS, R.A.M. Early experiences with sulprostone in cervical maturation. In: Schering AG. International Sulprostone Symposium, Vienna, 1978: scientific papers. Groton, Connecticut, Pfizer, Inc., [1978]. (Paper 28) 4 p.

289. LIGGINS, G.C. The treatment of missed abortion by high dosage syntocinon intravenous infusion. Journal of Obstetrics and Gynaecology of the British Empire 69(2): 277-281. April 1962.

290. LILARAM, D., BASU, S., KHAN, P.K., KANGILAL, and NAG, J. A comparative study of midtrimester pregnancy termination with saline, prostaglandin and urea at the Calcutta Medical Research Institute and Hospital. In: Pachauri, S., ed. Fourth transaction of scientific papers at the India FRP Contributors' Conference, Bombay, [India], February 24, 1977. Calcutta, India, India Fertility Research Programme, September 1977. p. 99-109.

291. LINDBERG, B. The induction of labour by the intravenous infusion of prostaglandin $F_{2\alpha}$. Prostaglandins 14(5): 993-1004. November 1977.

292. LINDGREN, L. The influence of uterine motility upon cervical dilatation in labor. American Journal of Obstetrics and Gynecology 117(4): 530-536. October 15, 1973.

293. LINDGREN, L. The physiology and pathology of the cervix during labour. Acta Obstetricia et Gynecologica Scandinavica 47(Suppl. 1): 39-56. 1968.

294. LINDMARK, G. and NILSSON, B.A. A comparative study of uterine activity in labour induced with prostaglandin $F_{2\alpha}$ or oxytocin and in spontaneous labour. 2. Characteristics of uterine activity and their effect on the progress of labour. Acta Obstetricia et Gynecologica Scandinavica 56(2): 87-94. 1977.

*295. LINDNER, H.R., ZOR, U., and KOHEN, F. Prostaglandins and prostaglandin antagonists in female reproduction: an overview. In: Turnbull, A.C., ed. Research and clinical forums. Sussex, England, Grange Press, [1980]. 48 p. (In press)

296. LIPPES, J. and HURD, M. The use of chlorpromazine and Lotomil to prevent and/or reduce the side effects of prostaglandin E_2 used for abortion. Contraception 12(5): 569-577. November 1975.

297. LOSERT, W., LOGE, O., SCHILLINGER, E., and CASALS-STENZEL, J. Influence on smooth muscles and other organ functions. In: Schering AG. International Sulprostone Symposium, Vienna, 1978: scientific papers. Groton, Connecticut, Pfizer, Inc., [1978]. (Paper 5) 11 p.

298. LOUDON, J.D.O. The use of high concentration oxytocin intravenous drips in the management of missed abortion. Journal of Obstetrics and Gynaecology of the British Empire 66(2): 277-281. April 1959.

299. LOWENSOHN, R. and BALLARD, C.A. Cervicovaginal fistula: an apparent increased incidence with prostaglandin $F_{2\alpha}$. American Journal of Obstetrics and Gynecology 119(8): 1057-1061. August 15, 1974.

300. LUEKEN, R.P. and LINDEMANN, H.-J. Local and systemic administration of sulprostone for cervical dilatation in non-pregnant patients. In: Schering AG. International Sulprostone Symposium, Vienna, 1978: scientific papers. Groton, Connecticut, Pfizer, Inc., [1978]. (Paper 26) 3 p.

301. LUNDSTRÖM, V. The myometrial response to intrauterine administration of $PGF_{2\alpha}$ and PGE_2 in dysmenorrheic women. Acta Obstetricia et Gynecologica Scandinavica 56(3): 167-172. 1977.

302. LUNDSTRÖM, V. and BYGDEMAN, M. Prostaglandin $F_{2\alpha}$ and E_2 in primary dysmenorrhea: myometrial sensitivity to $PGF_{2\alpha}$ and PGE_2 in dysmenorrhea. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. 10 p. (To be published by Raven Press)

303. LUNDSTRÖM, V., BYGDEMAN, M., FOTIOU, S., GRÉEN, K., and KINOSHITA, K. Abortion in early pregnancy by vaginal administration of 16,16-dimethyl-PGE_2 in comparison with vacuum aspiration. Contraception 16(2): 167-173. August 1977.

304. LUNDSTRÖM, V., BYGDEMAN, M., and GRÉEN, K. Clinical usefulness of prostaglandin treatment for termination of first trimester pregnancy. Presented at the Program for Applied Research on Fertility Regulation [PARFR] Workshop on Risks, Benefits, and Controversies in Fertility Control, Arlington, Virginia, March 13-16, 1977. 15 p.

305. LUNDSTRÖM, V. and GRÉEN, K. Endogenous levels of prostaglandin $F_{2\alpha}$ and its main metabolites in plasma and endometrium of normal and dysmenorrheic women. American Journal of Obstetrics and Gynecology 130(6): 640-646. March 15, 1978.

306. LUNDSTRÖM, V., GRÉEN, K., and WIQVIST, N. Prostaglandins, indomethacin and dysmenorrhea. Prostaglandins 11(5): 893-904. May 1976.

307. MACHT, D.I. and DAVIS, M.E. Experimental studies, old and new, on menstrual toxin. Journal of Comparative Physiology and Psychology 18: 113-134. August 1934.

308. MACHT, D.I. and LUBIN, D.S. A phyto-pharmacological study of menstrual toxin. Journal of Pharmacology and Experimental Therapeutics 22: 413-466. January 1924.

309. MACKENZIE, I.Z., BRADLEY, S., and MITCHELL, M.D. PG levels in cord venous plasma at delivery related to labour. Presented at the 4th International Prostaglandin Conference, Washington, D.C., 1979.

310. MACKENZIE, I.Z. and EMBREY, M.P. Cervical ripening with intravaginal prostaglandin E_2 gel. British Medical Journal 2(6099): 1381-1384. November 26, 1977.

311. MACKENZIE, I.Z. and EMBREY, M.P. A comparison of PGE_2 and $PGF_{2\alpha}$ vaginal gel for ripening the cervix before induction of labour. British Journal of Obstetrics and Gynaecology 86(3): 167-170. March 1979.

*312. MACKENZIE, I.Z. and EMBREY, M.P. The influence of pre-induction vaginal prostaglandin E_2 gel upon subsequent labour. British Journal of Obstetrics and Gynaecology 85(9): 657-661. September 1978.

313. MACKENZIE, I.Z., EMBREY, M.P., DAVIES, A.J., and GUILLEBAUD, J. Very early abortion by prostaglandins. Lancet 1(8076): 1223-1226. June 10, 1978.

314. MANABE, Y. Artificial abortion at midpregnancy by mechanical stimulation of the uterus: a review of 20 years' experience with current methods in Japan. American Journal of Obstetrics and Gynecology 105(1): 132-146. September 1, 1969.

315. MANCHESTER, D., MARGOLIS, H.S., and SHELDON, R.E. Possible association between maternal indomethacin therapy and primary pulmonary hypertension of the newborn. American Journal of Obstetrics and Gynecology 126(4): 467-469. October 15, 1976.

316. MANDELIN, M. Termination of early pregnancy by a single-dose 3.0 mg 15-methyl $PGF_{2\alpha}$ methyl ester vaginal suppository. Prostaglandins 16(1): 143-152. July 1978.

317. MANDELIN, M. and KAJANOJA, P. Induction of second trimester abortion: comparison between vaginal 15-methyl-$PGF_{2\alpha}$ methyl ester and intra-amniotic $PGF_{2\alpha}$. Prostaglandins 16(6): 995-1001. December 1978.

318. MANUILOVA, I.A., MURASHKO, L.E., FANCHENKO, N.D., KOLODJKO, V.G., CHERNUKHA, E.A., RAHMAN, S.A., BYGDEMAN, M., CEKAN, S.Z., and DICZFALUSY, E. Effect of intravenous infusion of 15-methyl-$PGF_{2\alpha}$ on plasma hormone levels during early pregnancy. Prostaglandins 17(2): 313-322. February 1979.

319. MARSHAM, P.R., DUKES, M., GERSKOWITCH, V.P., and WAKELING, A.E. Stable prostaglandin analogues with E-like properties. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. 4 p. (To be published by Raven Press)

320. MARTIN, J.N., BYGDEMAN, M., LEADER, A., and WIQVIST, N. Early second trimester abortion by the extra-amniotic instillation of Rivanol solution and a single $PGF_{2\alpha}$ dose. Contraception 11(5): 523-531. May 1975.

321. MASSEY, S.E., VARADY, J.C., and HENZL, M.R. Pain relief with naproxen following insertion of an intrauterine device. Journal of Reproductive Medicine 13(6): 226-231. December 1974.

322. MATSUMOTO, K., AKIMOTO, A., TSUDA, T., and TSUBOSHIMA, M. Effects of 16,16-dimethyl-trans-Δ^2-PGE_1-methyl ester (ONO-802) on uterine motility in animals. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. 3 p. (To be published by Raven Press)

323. MATSUMOTO, K., SAKAI, T., KOIDE, T., TSUDA, T., AKIMOTO, A., TSUBOSHIMA, M., and OSHIMA, K. Comparison between 16,16-dimethyl-trans-Δ^2-PGE_1 methyl ester (ONO-802) and primary PGs on abortifacient profile in pregnant animals. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. 3 p. (To be published by Raven Press)

324. McCRACKEN, J.A., GLEW, M.E., HULL, S.S., Jr., BOVAIRD, L., UNDERWOOD, L., and FRIED, J. Comparative luteolytic effects of prostaglandin $F_{2\alpha}$ and its 13-dehydro analogs in vivo. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. 30 p. (To be published by Raven Press)

325. McNATTY, K.P., HENDERSON, K.M., and SAWERS, R.S. Effect of prostaglandin $F_{2\alpha}$ and E_2 on the production of progesterone by human granulosa cells in tissue culture. Journal of Endocrinology 67(1): 231-240. October 1975.

326. McNICHOL, E. and GRAY, H. Adverse reaction to extra-amniotic prostaglandin E. British Journal of Obstetrics and Gynaecology 84(3): 229-230. March 1977.

327. MEHTA, A.C., DAVE, S., and SHAH, P. Evaluation of methods of midtrimester pregnancy termination. In: Pachauri, S., ed. Fourth transaction of scientific papers at the India FRP Contributors' Conference, Bombay, [India], February 24, 1977. Calcutta, India, India Fertility Research Programme, September 1977. p. 59-67.

328. MILLER, N.F. Additional light on the dysmenorrhea problem. Journal of the American Medical Association 95(24): 1796-1803. December 13, 1930.

329. MISHELL, D.R., Jr., THORNEYCROFT, I.H., NAGATA, Y., MURATA, T., and NAKAMURA, R.M. Serum gonadotropin and steroid patterns in early human gestation. American Journal of Obstetrics and Gynecology 117(5): 631-642. November 1, 1973.

330. MULLICK, B. and DAWN, C.S. A study of 15(S)-15-methyl prostaglandin $F_{2\alpha}$ vaginal suppositories for midtrimester pregnancy termination: a preliminary report. In: Pachauri, S., ed. Fourth transaction of scientific papers at the India FRP Contributors' Conference, Bombay, [India], February 24, 1977. Calcutta, India, India Fertility Research Programme, September 1977. p. 69-72.

331. MUNDOW, L.S. The induction of labour with prostaglandin E_2 tablets. Irish Medical Journal 70(9): 280-281. June 18, 1977.

332. MURPHY, R.C., HAMMARSTRÖM, S., and SAMUELSSON, B. Leukotriene C: a slow-reacting substance from murine mastocytoma cells. Proceedings of the National Academy of Sciences 76(9): 4275-4279. September 1979.

333. NAJAK, Z., HILLIER, K., and KARIM, S.M.M. The action of prostaglandins on the human isolated non-pregnant cervix. Journal of Obstetrics and Gynaecology of the British Commonwealth 77(8): 701-709. August 1970.

334. NIEBYL, J.R. [Johns Hopkins University] [Treatment of premature labor with prostaglandins] Personal communication, January 18, 1980.

335. NIELSEN, K.R., GREGERSEN, E., LARSEN, J.F., and OLSEN, C.E. Prostaglandin $F_{2\alpha}$ and oxytocin compared with hypertonic saline and oxytocin for the induction of second trimester abortion. Acta Obstetricia et Gynecologica Scandinavica (Suppl. 37): 57-60. 1974.

336. O'GRADY, J.P., CALDWELL, B.V., AULETTA, F.J., and SPEROFF, L. The effects of an inhibitor of prostaglandin synthesis (indometha-

cin) on ovulation, pregnancy, and pseudopregnancy in the rabbit. Prostaglandins 1(2): 97-106. February 1972.

337. O'HERLIHY, C. and MACDONALD, H.N. Influence of preinduction prostaglandin E_2 vaginal gel on cervical ripening and labor. Obstetrics and Gynecology 54(6): 708-710. December 1979.

338. ÖLUND, A. The effect of indomethacin on the instillation-abortion interval in Rivanol-induced mid-trimester abortion. Acta Obstetricia et Gynecologica Scandinavica 58(1): 121-122. 1979.

339. ÖLUND, A. Lysozyme in amniotic fluid during Rivanol-induced second trimester abortion. Prostaglandins 17(1): 149-154. January 1979.

340. ÖLUND, A. and LARSSON, B. Comparison of extra-amniotic instillation of Rivanol and $PGF_{2\alpha}$ either separately or in combination followed by oxytocin for second trimester abortion. Acta Obstetricia et Gynecologica Scandinavica 57(4): 333-336. 1978.

341. ÖLUND, A. and LUNELL, N.-O. Arachidonic acid in amniotic fluid after extra-amniotic instillation of Rivanol for midtrimester abortion. Prostaglandins 16(6): 989-994. December 1978.

342. OMINI, C., FOLCO, G.C., PASARGIKLIAN, R., FANO, M., and BERTI, F. Prostacyclin (PGI_2) in pregnant human uterus. Prostaglandins 17(1): 113-120. January 1979.

343. OMINI, C., MONCADA, S., and VANE, J.R. The effects of prostacyclin (PGI_2) on tissues which detect prostaglandins (PG's). Prostaglandins 14(4): 625-632. October 1977.

344. OMINI, C., PASARGIKLIAN, R., BRUNELLI, G., FOLCO, G.C., and BERTI, F. Prostacyclin and human uterus. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1969. (To be published by Raven Press)

345. OMINI, C., PASARGIKLIAN, R., FOLCO, G.C., FANO, M., and BERTI, F. Pharmacological activity of PGI_2 and its metabolite 6-oxo-$PGF_{1\alpha}$ on human uterus and fallopian tubes. Prostaglandins 15(6): 1045-1054. June 1978.

346. ORR, J.W., Jr., HUDDLESTON, J.F., GOLDENBERG, R.L., KNOX, G.E., and DAVIS, R.O. Association of extrauterine fetal death with failure of prostaglandin E_2 suppositories. Obstetrics and Gynecology 53(3): 565-585. March 1979.

347. OTT, E.R. Cervical dilatation: a review. Population Reports, Series F, No. 6. Population Information Program, September 1977. 20 p.

348. PANG, C.Y. and BEHRMAN, H.R. Acute effect of prostaglandin $F_{2\alpha}$ on luteal and ovarian function and blood flow. Biology of Reproduction 18(Suppl.1): 66a. 1978.

349. PANTELAKIS, S.N., PAPADIMITRIOU, G.C., and DOXIADIS, S.A. Influence of induced and spontaneous abortion on the outcome of subsequent pregnancies. American Journal of Obstetrics and Gynecology 116(6): 799-805. July 15, 1973.

350. PEARCE, D.J. Pre-induction priming of the uterine cervix with oral prostaglandin E_2 and a placebo. Prostaglandins 14(3): 571-576. September 1977.

351. PERRY, G., SIEGAL, B., and HELD, B. Uterine trauma associated with midtrimester abortion induced by intra-amniotic prostaglandin $F_{2\alpha}$ with and without comcomitant use of oxytocin. Prostaglandins 13(6): 1147-1159. June 1977.

352. PHARRIS, B.B. and WYNGARDEN, L.J. The effect of prostaglandin $F_{2\alpha}$ on the progestogen content of ovaries from pseudopregnant rats. Proceedings of the Society for Experimental Biology and Medicine 130(1): 92-94. January-April 1969.

353. PHELAN, J.P., MEGUIAR, R.V., MATEY, D., and NEWMAN, C. Dramatic pyrexic and cardiovascular response to intravaginal prostaglandin E_2. American Journal of Obstetrics and Gynecology 132(1): 28-32. September 1, 1978.

354. PICKLES, V.R. A plain-muscle stimulant in the menstruum. Nature 180(4595): 1198-1199. November 30, 1957.

355. PICKLES, V.R. Prostaglandins and dysmenorrhea: historical survey. Acta Obstetricia et Gynecologica Scandinavica (Suppl. 87): 7-12. 1979.

356. PICKLES, V.R., HALL, W.J., BEST, F.A., and SMITH, G.N. Prostaglandins in endometrium and menstrual fluid from normal and dysmenorrheic subjects. Journal of Obstetrics and Gynaecology of the British Commonwealth 72(2): 185-192. April 1965.

357. PIKE, J.E. Total synthesis of prostaglandins. Fortschritte der Chemie Organischer Naturstoffe 28: 313-342. 1970.

358. POTTS, D.M. [International Fertility Research Program] [First trimester abortion] Personal communication, January 31, 1980.

359. POWELL, W.S., HAMMARSTROM, S., SAMUELSSON, B., and SJÖBERG, B. Prostaglandin-$F_{2\alpha}$ receptor in human corpora lutea. [Letter] Lancet 1(7866): 1120. June 1, 1974.

360. PRITCHARD, J.A. and RATNOFF, O.D. Studies of fibrinogen and other hemostatic factors in women with intrauterine death and delayed delivery. Surgery, Gynecology and Obstetrics 101(4): 467-477. October 1955.

361. PULKKINEN, M.O. and CSAPO, A.I. The effect of ibuprofen on the intrauterine pressure and menstrual pain of dysmenorrheic patients. Prostaglandins 15(6): 1055-1062. June 1978.

362. PULKKINEN, M.O., HENZL, M.R., and CSAPO, A.I. The effect of naproxen-sodium on the prostaglandin concentrations of the menstrual blood and uterine "jet-washings" in dysmenorrheic women. Prostaglandins 15(3): 543-550. March 1978.

363. RAGAB, M.I. and EDELMAN, D.A. Midtrimester abortion: a comparison of intraamniotic prostaglandin $F_{2\alpha}$ and hypertonic saline. International Journal of Gynaecology and Obstetrics 14(5): 393-396. March-April 1976.

364. RAJAN, R., DEVI, L.U., and USHA, K.R. Urea and 15-Me-prostaglandin $F_{2\alpha}$ for midtrimester abortion. Journal of Obstetrics and Gynaecology of India 29(2): 2?9-294. April 1979.

365. RAO, C.V., GRIFFIN, L.P., and CARMAN, F.R., Jr. Prostaglandin $F_{2\alpha}$ binding sites in human corpora lutea. Journal of Clinical Endocrinology and Metabolism 44(6): 1032-1037. June 1977.

366. RAOTE, V.B., ANANTHAKRISHNAN, R., GANGULI, A.C., and KRISHNA, U.R. The augmentary effect of intramuscular prostaglandins on ethacridine lactate. Journal of Postgraduate Medicine 25(1): 30-32. 1979.

367. RAVENHOLT, R. and SPEIDEL, J. Prostaglandins in family planning strategy. Annals of the New York Academy of Sciences 180: 537-552. 1971.

368. RISK, A., MOOTABAR, H., PORTA, P.J., and DILLON, T.F. Second trimester abortions: review of four procedures. New York State Journal of Medicine 75(7): 1022-1027. June 1975.

369. ROBINS, J. A clinical comparison of intra-amniotic prostaglandin $F_{2\alpha}$ and intra-amniotic hypertonic saline for midtrimester pregnancy termination. Advances in Planned Parenthood 13(2): 27-34. 1978.

370. ROBINS, J. Early first-trimester abortion induction by Silastic vaginal devices for continuous release of 15(S)-15-methyl prostaglandin $F_{2\alpha}$ methyl ester. Fertility and Sterility 28(10): 1048-1055. October 1977.

371. RORIE, D.K. and NEWTON, N. Histologic and chemical studies of the smooth muscle in the human cervix and uterus. American Journal of Obstetrics and Gynecology 99(4): 466-469. October 15, 1967.

372. ROSÉN, A.-S., NYSTEDT, L., BYGDEMAN, M., and LUNDSTRÖM, V. Acceptability of a nonsurgical method to terminate very early pregnancy in comparison to vacuum aspiration. Contraception 19(2): 107-117. February 1979.

373. ROUX, J.F., MOFID, M., MOSS, P.L., and DMYTRUS, K.C. Effect of elective induction of labor with prostaglandins $F_{2\alpha}$ and E_2 and oxytocin on uterine contraction and relaxation. American Journal of Obstetrics and Gynecology 127(7): 718-722. April 1, 1977.

374. RUSSELL, J.A., TAYLOR, P.L., and KELLY, R.W. Preliminary observations of the effects of 19-hydroxy-prostaglandin E-1 on the activity of the human myometrium in vitro. Journal of Reproduction and Fertility 56(1): 33-36. May 1979.

375. RUTLAND, A. and BALLARD, C. Vaginal prostaglandin E_2 for missed abortion and intrauterine fetal death. American Journal of Obstetrics and Gynecology 128(5): 503-506. July 1, 1977.

376. SAASTAMOINEN, J., VARTIAINEN, M., and CASTREN, O. Cervix dilatation with sulprostone 250 and 500 mcg i.m. in early pregnancy. In: Schering AG. International Sulprostone Symposium, Vienna, 1978: scientific papers. Groton, Connecticut, Pfizer, Inc., [1978] (Paper 27) 4 p.

377. SAMUELSSON, B., HAMBERG, M., and SWEELEY, C.C. Quantitative gas chromatography of prostaglandin E_1 at the nanogram level: use of deuterated carrier and multiple-ion analyzer. Analytical Biochemistry 38(1): 301-304. November 1970.

378. SANDLER, R.Z., KNUTZEN, V.K., MILANO, C.M., and GLEICHER, N. Uterine rupture with the use of vaginal prostaglandin E_2 suppositories. American Journal of Obstetrics and Gynecology 134(3): 348-349. June 1, 1979.

379. SANDOW, J., VON RECHENBERG, W., and KILLE, S. Influence of a synthetic prostaglandin on luteal function and pregnancy in guinea pigs. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. (To be published by Raven Press)

380. SANDS, R.X., BURNHILL, M.S., and HAKIM-ELAHI, E. Postabortal uterine atony. Obstetrics and Gynecology 43(4): 595-598. April 1974.

381. SANGER, G.J. and BENNETT, A. Fenamates may antagonise the actions of prostaglandin endoperoxides in human myometrium. Presented at the 4th International Prostaglandin Conference, Washington D.C., May 27-31, 1979. 11 p. (To be published by Raven Press)

382. SANGER, G.J. and BENNETT, A. PI or PGE_2 selectively antagonise responses to excitatory PGs in human isolated myometrium. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. (To be published by Raven Press)

383. SCARAMUZZI, R.J. and BAIRD, D.T. The oestrous cycle of the ewe after active immunization against prostaglandin $F_{2\alpha}$. Journal of Reproduction and Fertility 46(1): 39-47. January 1976.

*384. SCHERING AG. International Sulprostone Symposium, Vienna, 1978: scientific papers. Groton, Connecticut, Pfizer, Inc., [1978] 175 p.

385. SCHICK, B. Das Menstruationsgift. [Menstrual toxin.] [GE] Wiener Klinische Wochenschrift 33(19): 395-397. May 6, 1920.

386. SCHIFFER, M.A., PAKTER, J., and CLAHR, J. Mortality associated with hypertonic saline abortions. Obstetrics and Gynecology 42(5): 759-764. November 1973.

387. SCHILLINGER, E. [Schering AG] [Sulprostone] Personal communication, July 13, 1979. 1 p.

388. SCHMIDT-GOLLWITZER, K., SCHUSSLER, B., ELGER, W., and SCHMIDT-GOLLWITZER, M. Neue therapeutische Moglichkeiten bei der Beendigung intakter und gestorter Schwangerschaften: Erfahrungen mit dem Prostaglandin E_2-Derivat Sulproston (SHB 286). [A new therapeutic approach for terminating intact and disturbed pregnancies: three years of experience with the prostaglandin E_2-derivative sulprostone (SHB 286).] [GE] Geburtshilfe und Frauenheilkunde 39(8): 667-675. August 1979.

389. SCHMIDT-GOLLWITZER, M., SCHUSSLER, B., SCHMIDT-GOLLWITZER, K., and NEVINNY-STIKEL, J. Recommendations for the treatment of induction of abortion with sulprostone. In: Schering AG. International Sulprostone Symposium, Vienna, 1978: scientific papers. Groton, Connecticut, Pfizer, Inc., [1978] (Paper 16) 11 p.

*390. SCHULMAN, H., SALDANA, L., LIN, C.-C., and RANDOLPH, G. Mechanism of failed labor after fetal death and its treatment with prostaglandin E_2. American Journal of Obstetrics and Gynecology 133(7): 742-752. April 1, 1979.

391. SCHUSSLER, B., SCHMIDT-GOLLWITZER, K., HOBICH, D., and SCHMIDT-GOLLWITZER, M. Efficacy and acceptability of intravenously administered sulprostone, a tissue-selective prostaglandin-E_2 derivative, for induction of first-trimester abortion. Contraception 19(1): 29-38. January 1979.

392. SCHWALLIE, P.C. and LAMBORN, K.R. Induction of abortion by intramuscular administration of (15S)-15-methyl $PGF_{2\alpha}$: an overview of 815 cases. Journal of Reproductive Medicine 23(6): 289-293. December 1979.

393. SCHWARTZ, M.L. and BRENNER, W.E. Termination of pregnancy complicated by anencephaly with intra-amniotic prostaglandin $F_{2\alpha}$. American Journal of Obstetrics and Gynecology 136(2): 203-204. January 15, 1980.

394. SEIFERT, B. and LIEDTKE, M.-P. Uterine Prostaglandine und Dysmenorrhoe. [Uterine prostaglandins and dysmenorrhea.] [GE] Zentralblatt für Gynäkologie 100(21): 1361-1366. 1978.

395. SEIFERT, B., LIEDTKE, M.-P., BROCKMANN, J., BEISSERT, M., GÖTTNER, H., ALEXANDER, H., and HERTER, U. Investigations of hormones during early abortion induced by prostaglandin $F_{2\alpha}$ and 15(S)-methyl-$PGF_{2\alpha}$. Acta Biologica et Medica Germanica 37(5-6): 955-957. 1978.

396. SEITCHIK, J., CHATKOFF, M.L., and HAYASHI, R.H. Intrauterine pressure waveform characteristics of spontaneous and oxytocin- or prostaglandin $F_{2\alpha}$-induced active labor. American Journal of Obstetrics and Gynecology 127(3): 223-227. February 1, 1977.

397. SETHI, A. and JALNAWALLA, S.F. Termination of second trimester pregnancy with single intra-amniotic and extra-amniotic instillation of prostaglandin $F_{2\alpha}$ and 15-methyl prostaglandin $F_{2\alpha}$. Journal of Obstetrics and Gynaecology of India 29(2): 274-282. April 1979.

398. SHALITA, R. Prostaglandins promise more effective fertility contol. Population Reports, Series G, No. 6. Population Information Program, September 1975. 19 p.

399. SHARMA, S.D., HALE, R.W., and SATO, N.E. Intramuscular (15S)-15-methyl prostaglandin $F_{2\alpha}$ for midtrimester and missed abortions. Obstetrics and Gynecology 46(4): 468-472. October 1975.

400. SHAW, S.T. and BALLARD, C.A. Subclinical coagulopathy following amnioinfusion with hypertonic saline. American Journal of Obstetrics and Gynecology 118(8): 1081-1088. April 15, 1974.

401. SHEPHERD, J., PEARCE, J.M.F., and SIMS, C.D. Induction of labour using prostaglandin E_2 pessaries. British Medical Journal 2(6182): 108-110. July 14, 1979.

402. SHEPHERD, J., SIMS, C., and CRAFT, I. Extra-amniotic prostaglandins E_2 and the unfavourable cervix. Lancet 2(7988): 709-710. October 2, 1976.

403. SHER, G. Induction of labor following intrauterine death with intra-amniotic hyperosmolar urea and prostaglandin $F_{2\alpha}$: evaluation of placental endocrine function and changes in coagulation parameters. American Journal of Obstetrics and Gynecology 134(5): 493-497. July 1, 1979.

404. SHERMAN, A.I. and VAKHARIYA, V.R. An evaluation of prostaglandin $F_{2\alpha}$ for the induction of labor at term. In: Southern, E.M., ed. The prostaglandins: clinical applications in human reproduction. [Brook Lodge Symposium, Augusta, Michigan] Mount Kisco, New York, Futura Publishing Co., 1972. p. 95-106.

405. SINGH, E.J., BACCARINI, I.M., and ZUSPAN, F.P. Levels of protaglandins $F_{2\alpha}$ and E_2 in human endometrium during the menstrual cycle. American Journal of Obstetrics and Gynecology 121(7): 1003-1006. April 1, 1975.

406. SKAKKEBAEK, N.E., KELLY, R.W., and CORKER, C.S. Prostaglandin concentrations in the semen of hypogonadal men during treatment with testosterone. Journal of Reproduction and Fertility 47(1): 119-12 . May 1976.

407. SLAUGHTER, L. and BALLARD, C.A. Midtrimester abortion with intramuscular injection of 15-methyl-prostaglandin $F_{2\alpha}$. Contraception 11(5): 533-540. May 1975.

408. SMITH, R.G., PALMORE, J.A., and STEINHOFF, P.G. The potential reduction of medical complications from induced abortion. International Journal of Gynaecology and Obstetrics 15(4): 337-346. January-February 1978.

409. SOUTHERN, E.M. Preliminary trials of vaginal Silastic devices containing (15S)-15 methyl prostaglandin $F_{2\alpha}$ methyl ester for the induction of menses and for pregnancy termination: summary of Brook Lodge Workshop, (January 29, 1976). Prostaglandins 12(Suppl.): 147-152. 1976.

410. SOUTHERN, E.M. [Upjohn Company] [Vaginal devices; intracervical catheter] Personal communication, January 1980.

*411. SOUTHERN, E.M., GUTKNECHT, G.D., MOHBERG, N.R., and EDELMAN, D.A. Vaginal prostaglandin E_2 in the management of fetal intrauterine death. British Journal of Obstetrics and Gynaecology 85(6): 437-441. June 1978.

412. SPARKS, R.M. and LEE, C.M. Clinical use of PGs in fertility control. Population Reports, Series G, No. 1. Population Information Program, April 1973. 15 p.

413. SPEARING, G. Alcohol, indomethacin, and salbutamol. Obstetrics and Gynecology 53(2): 171-174. February 1979.

414. SPEROFF, L., ANDERSON, G., BARR, M., and CATES, W., Jr. Is there a best way to do midtrimester abortions? Contemporary Ob/Gyn 13(5): 106-141. May 1979.

415. STANDER, R.W., FLESSA, H.C., GLUECK, H.I., and KISKER, T. Changes in maternal coagulation factors after intra-amniotic injection of hypertonic saline. Obstetrics and Gynecology 37(5): 660-666. May 1971.

416. STEINER, H., ROBRECHT, D., ZAHRADNIK, H.P., and HILLEMANNS, H.-G. The use of telemetric systems in obstetrics: an ideal monitoring method for oral PGE_2 induction of labor. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. (To be published by Raven Press)

417. STEINER, H., ROBRECHT, D., ZAHRADNIK, H.P., MROSS, F., and HILLEMANNS, H.-G. Telemetrische Geburtsuberwachung bei Einleitung mit Prostaglandin-E_2-Tabletten. [Telemetric labor monitoring during induction with prostaglandin E_2 tablets.] [GE] Geburtshilfe und Frauenheilkunde 39(4): 328-332. April 1979.

418. STEINER, H., WEITZEL, R., and ZAHRADNIK, H.P. Vergleichende Untersuchungen zwischen Geburtseinleitungen mit Prostaglandin und Orasthin. [Comparison of labor induction with prostaglandin and Orasthin.] [GE] Geburtshilfe und Frauenheilkunde 36(9): 773-777. September 1976.

419. STEINER, H., ZAHRADNIK, H.P., BRECKWOLDT, M., ROBRECHT, D., and HILLEMANNS, H.G. Cervical ripening prior to induction of labor (intracervical application of a PGE_2 viscous gel). Prostaglandins 17(1): 125-133. January 1979.

420. STRAUSS, J.H., WILSON, M., CALDWELL, D., OTTERSON, W., and MARTIN, A.O. Laminaria use in midtrimester abortions induced by intra-amniotic prostaglandin $F_{2\alpha}$ with urea and intravenous oxytocin. American Journal of Obstetrics and Gynecology 134(3): 260-264. June 1, 1979.

421. STROH, G. and HINMAN, A.R. Reported live births following induced abortions: two and one-half years' experience in upstate New York. American Journal of Obstetrics and Gynecology 126(1): 83-90. September 1, 1976.

422. STROUP, P.E. Medical termination of midtrimester pregnancy in a community hospital. Journal of the Medical Society of New Jersey 74(9): 747-752. September 1977.

*423. STUBBLEFIELD, P.G. Current technology for abortion. Current Problems in Obstetrics and Gynecology 11(4): 1-44. December 1978.

424. STUBBLEFIELD, P.G. [Harvard University] [Second trimester abortion] Personal communication, February 1980.

425. STUBBLEFIELD, P.G., NAFTOLIN, F., FRIGOLETTO, F.D., and RYAN, K.J. Laminaria augmentation of intra-amniotic $PGF_{2\alpha}$ for mid-

trimester pregnancy termination. Prostaglandins 10(3): 413-422. September 1975.

426. STUBBLEFIELD, P., NAFTOLIN, F., FRIGOLETTO, F.D., and RYAN, K.J. Laminaria augmentation of intra-amniotic prostaglandin $F_{2\alpha}$ for midtrimester pregnancy termination. [Abstract] In: Samuelsson, B. and Paoletti, R., eds. Advances in prostaglandin and thromboxane research. Vol. 2. New York, Raven Press, 1976. p. 977.

427. TAKAGI, S., SAKATA, H., YOSHIDA, T., DEN, K., FUJII, T.K., AMEMIYA, H., and TOMITA, M. Termination of early pregnancy by ONO-802 suppositories (16,16-dimethyl-trans-Δ^2-PGE$_1$ methyl ester). Prostaglandins 15(5): 913-919. May 1978.

429. TAYLOR, P.L. and KELLY, R.W. 19-hydroxylated prostaglandins as the major prostaglandins of human semen. Nature 250(5468): 665-667. August 23, 1974.

430. TEJUJA, S., CHOUDHURY, S.D., and MANCHANDA, P.K. Use of intra- and extra-amniotic prostaglandins for the termination of pregnancies: report of multicentric trial in India. Contraception 18(6): 641-652. December 1978.

431. TEJUJA, S., CHOUDHURY, S.D., MANCHANDA, P.K., and MALHOTRA, U. Indian experience with a single long-acting vaginal suppository for the termination of pregnancies. Contraception 19(2): 191-196. February 1979.

432. THIERY, M., DEFOORT, P., BENIJTS, G., VAN EYCK, J., HENNAY, T., VAN KETS, H., and MARTENS, C. Effectiveness of extra-ovular injection of prostaglandin E_2 in Tylose® gel to ripen the cervix prior to elective induction of labor at term. Prostaglandins 14(2): 381-388. August 1977.

433. THIERY, M., DE HEMPTINNE, D., VANDERHEYDEN, K., VROMAN, S., DEROM, R., VAN KETS, H., and MARTENS, G. Intravenous prostaglandin $F_{2\alpha}$ and amniotomy for the elective induction of labor at term. Journal of Perinatal Medicine 1(4): 268-282. 1973.

434. THIERY, M. and MARTENS, G. Ripening the unfavourable cervix. [Letter] Lancet 2 (8104): 1378. December 23 and 30, 1978.

435. THIERY, M., VROMAN, S., DE HEMPTINNE, D., YO SE SIAN, A., VANDERHEYDEN, K., VAN KETS, H., MARTENS, G., DEROM, R., and ROLLY, G. Elective induction of labor conducted under lumbar epidural block: 2. Labor induction by amniotomy and intravenous prostaglandin. European Journal of Obstetrics, Gynecology and Reproductive Biology 7(3): 181-200. 1977.

436. THIERY, M., YO LE SIAN, A., DE HEMPTINNE, D., DEROM, R., MARTENS, G., VAN KETS, H., and AMY, J.J. Induction of labour with prostaglandin E_2 tablets. Journal of Obstetrics and Gynaecology of the British Commonwealth 81(4): 303-306. April 1974.

437. THIERY, M., YO LE SIAN, A., DE HEMPTINNE, D., DEROM, R., VAN KETS, H., MARTENS, G., and AMY, J.J. Elective induction of labor at term by amniotomy and intravenous prostaglandin E_2. European Journal of Obstetrics, Gynecology and Reproductive Biology 4(6): 209-214. 1975.

438. THOMAS, F.V., LOPES, P., KATZ, A.R., and DELECOUR, M. Utilisation des prostaglandines pour les interruptions de grossesse au second trimestre. [The use of prostaglandins for termination of pregnancy in the second trimester.] [FR] Journal de Gynécologie d'Obstétrique et de Biologie de la Reproduction 7(1): 119-128. January 1978.

439. THOMAS, J.-P., DORFLINGER, L.J., and BEHRMAN, H.R. Mechanism of the rapid antigonadotropic action of prostaglandins in cultured luteal cells. Proceedings of the National Academy of Sciences 75(3): 1344-1348. March 1978.

440. TIETZE, C. Midtrimester abortion: a global view. Presented at the Conference on Second Trimester Abortion: Perspectives After a Decade of Experience, Chapel Hill, North Carolina, September 27-28, 1979. 18 p. (To be published by PSG Publishing Co.)

441. TIETZE, C. and GUTTMACHER, A.F. Deaths after legal abortions. Lancet 1(7794): 105. January 13, 1973.

442. TIETZE, C. and LEWIT, S. Joint Programme for the Study of Abortion (JPSA): Early medical complications of legal abortion. Studies in Family Planning 3(6): 97-122. June 1972.

443. TIETZE, C. and MURSTEIN, M.C. Induced abortion: 1975 factbook. 2nd ed. Reports on Population/Family Planning, No. 14, December 1975. 76 p.

444. TOM, W.K.C., SRIBYATTA, B., THORNEYCROFT, I.H., and MISHELL, D.R., Jr. Fertility regulation with cyclic luteal phase vaginal administration of prostaglandin $F_{2\alpha}$. Contraception 6(6): 479-488. December 1972.

445. TOMINAGA, Y., TWASA, Y., MIZU, M., KONDO, Y., TATSUMURA, M., SAKAI, K., TAKAHASHI, S., and MAEDA, K. The basic and clinical studies on the termination of early pregnancy by the vaginal administration of 16,16-dimethyl-trans-Δ^2-prostaglandin E_1 methyl ester (ONO-802). In: University of Indonesia. School of Medicine. Proceedings of the 7th Asian Congress of Obstetrics and Gynecology, Bangkok, Thailand, November 20-25, 1977. Jakarata, Indonesia, University of Indonesia, [1978]. p. 73-78.

446. TOPPOZADA, M., EL-ATTAR, A., EL-AYYAT, M., and KHAMIS, Y. Management of uterine bleeding by PGs or their synthesis inhibitors. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. 5 p. (To be published by Raven Press)

447. TRICOMI, V. and KOHL, S.G. Fetal death in utero. American Journal of Obstetrics and Gynecology 74(5): 1092-1097. November 1957.

448. TSAKOK, F.H.M., GRUDZINSKAS, J.G., KARIM, S.M.M., and RATNAM, S.S. The routine use of oral prostaglandin E_2 in induction of labour. British Journal of Obstetrics and Gynaecology 82(11): 894-898. November 1975.

449. TSUBOSHIMA, M. [ONO Pharmaceutical Co., Ltd., Osaka, Japan] [Prostaglandins] Personal communication, August 31, 1979. 3 p.

450. TULCHINSKY, D. and HOBEL, C.J. Plasma human chorionic gonadotropin, estrone, estradiol, estriol, progesterone and 17α-hydroxyprogesterone in human pregnancy: 3. Early normal pregnancy. American Journal of Obstetrics and Gynecology 117(7): 884-893. December 1, 1973.

451. TURKSOY, N.R. and SAFAII, H.S. Immediate effect of prostaglandin $F_{2\alpha}$ during the luteal phase of the menstrual cycle. Fertility and Sterility 26(7): 634-637. July 1975.

452. TYLER, C.W., Jr. and CATES, W., Jr. [Response to the letter by Drs. Wolf and Rubinstein regarding the safety of prostaglandin $F_{2\alpha}$ in abortion.] [Letter] American Journal of Obstetrics and Gynecology 131(2): 230-231. May 15, 1978.

453. TYLER, C.W., Jr., CATES, W., Jr., and GRIMES, D.A. The benefits, risks, and controversies in pregnancy termination: an overview. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Risks, benefits, and controversies in fertility control. [Proceedings of the workshop, Arlington, Virginia, March 13-16, 1977] Hagerstown, Maryland, Harper and Row, 1978. (PARFR Series on Fertility Regulation) p. 390-400.

454. ULBRICH, I. and BARTELS, H. Clinical results with sulprostone. In: Schering AG. International Sulprostone Symposium, Vienna, 1978: scientific papers. Groton, Connecticut, Pfizer, Inc., [1978]. (Paper 7) 12 p.

455. ULMSTEN, U., WINGERUP, L., and ANDERSSON, K.-E. Comparison of prostaglandin E_2 and intravenous oxytocin for induction of labor. Obstetrics and Gynecology 54(5): 581-584. November 1979.

456. UNITED STATES. CENTER FOR DISEASE CONTROL [CDC]. FAMILY PLANNING EVALUATION DIVISION. Abortion surveillance 1977. Atlanta, Georgia, CDC, September 1979. 62 p.

457. UNITED STATES. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE [USDHEW]. CENTER FOR DISEASE CONTROL. Abortion surveillance 1976. Atlanta, Georgia, USDHEW, August 1978. (DHEW Publication No. (CDC) 78-8205) 49 p.

458. UNITED STATES. SUPREME COURT. *Roe v. Wade*. 410 U.S. 113 (1973).

459. UPJOHN COMPANY. Prostin E_2 (dinoprostone) vaginal supposity. [Package insert] Kalamazoo, Michigan, Upjohn Company, September 1977. 2 p.

460. UPJOHN COMPANY. Prostin $F_{2\alpha}$ (dinoprost tromethamine). [Package insert] Kalamazoo, Michigan, Upjohn Company, April 1979. 2 p.

461. UPJOHN COMPANY. Prostin/15 M (carboprost tromethamine) sterile solution. [Package insert] Kalamazoo, Michigan, Upjohn Company, February 1979. 2 p.

462. UPJOHN COMPANY. Upjohn scientists synthesize stable prostaglandin for potential use in reproductive physiology. [Press release] May 29, 1979. 3 p.

463. URSELL, W. Induction of labour following fetal death. Journal of Obstetrics and Gynaecology of the British Commonwealth 79(3): 260-264. March 1972.

464. VALENTINE, B.H. Intravenous oxytocin and oral prostaglandin E_2 for ripening of the unfavourable cervix. British Journal of Obstetrics and Gynaecology 84(11): 846-854. November 1977.

465. VAN DEN BERG, A.S. [Bloemenhove Clinic, Heemstede, Netherlands] [Sulprostone] Personal communication. May 30, 1979. 1 p.

466. VAN DEN BERG, A.S. and NIERMEIJER, O. Termination of advanced second trimester pregnancy with intraamnial sulprostone. In: Schering AG. International Sulprostone Symposium, Vienna, 1978: scientific papers. Groton, Connecticut, Pfizer, Inc., [1978]. (Paper 15) 2 p.

467. VAN DORP, D.A., BEERTHUIS, R.K., NUGTEREN, D.H., and VONKEMAN, H. The biosynthesis of prostaglandins. Biochimica Biophysica Acta 90: 204-207. 1964.

468. VENGADASALAM, D., LEAN, T.H., and EDELMAN, D.A. Induction of abortion with 15(S)-15-methyl $PGF_{2\alpha}$ (tham) vaginal suppositories. International Journal of Gynaecology and Obstetrics 15(1): 93-95. July-August 1977.

469. VON EULER, U.S. An adrenaline-like action in extracts from the prostatic and related glands. Journal of Physiology 81(1): 102-112. March 29, 1934.

470. VON EULER, U.S. A depressor substance in the vesicular gland. Journal of Physiology (London) 84: 21P-22P. March 16, 1935.

471. VON EULER, U.S. Über die spezifische blutdrucksenkende Substanz des menschlichen Prostata- und Samenblasensekretes. [On the specific blood pressure lowering substance of the human prostate and seminal vesicle secretions.] [GE] Klinische Wochenschrifte 14(33): 1182-1183. 1935.

472. VON MAILLOT, K., STUHLSATZ, H.W., MOHANARADHAKRISHAN, V., and GREILING, H. Changes in the glycosaminoglycans distribution pattern in the human uterine cervix during pregnancy and labor. American Journal of Obstetrics and Gynecology 135(4): 503-506. October 15, 1979.

473. VON MAILLOT, K. and ZIMMERMANN, B.K. The solubility of collagen of the uterine cervix during pregnancy and labour. Archiv fur Gynäkologie 220(4): 275-280. April 1976.

474. WAGATSUMA, T., TABUCHI, T., TABEI, T., and KAKU, R. Interruption of pregnancy with vaginal suppositories containing 16,16-dimethyl-trans-Δ^2-prostaglandin E_1 methyl ester. Contraception 19(6): 591-597. June 1979.

475. WALLIS, R.M. and HILLIER, K. Effect of prostanoids and their precursors on collagen dissolution in the non-pregnant cervix. [Abstract] Presented at the Society for the Study of Fertility, Glasgow, Scotland, July 1979.

476. WEICHELL, H. Intramural administration of sulprostone for the induction of abortion on an out-patient basis. In: Schering AG. International Sulprostone Symposium, Vienna, 1978: scientific papers. Groton, Connecticut, Pfizer, Inc., [1978]. (Paper 25) 5 p.

477. WEINBERG, P.C., LINMAN, J.E., and LINMAN, S.K. Intraamniotic urea for induction of midtrimester pregnancy termination: a further evaluation. Obstetrics and Gynecology 45(3): 325-327. March 1975.

478. WEISS, R.R., TEJANI, N., ISRAELI, I., EVANS, M.I., BHAKTHAVATHSALAN, A., and MANN, L.I. Priming of the uterine cervix with oral prostaglandin E_2 in the term multigravida. Obstetrics and Gynecology 46(2): 181-184. August 1975.

479. WELLMAN, L. and IACOBSON, A. Intra-aminiotic prostaglandin $F_{2\alpha}$ and urea for midtrimester abortion. Fertility and Sterility 27(12): 1374-1379. December 1976.

480. WENTZ, A.C. and JONES, G.S. Transient luteolytic effect of prostaglandin $F_{2\alpha}$ in the human. Obstetrics and Gynecology 42(2): 172-181. August 1973.

481. WHITTLE, B.J.R. Prostaglandin synthetase inhibitors: drugs which affect arachidonic acid metabolism. Acta Obstetricia et Gynecologica Scandinavica (Suppl. 87): 21-26. 1979.

482. WIDHOLM, O. Dysmenorrhea during adolescence. Acta Obstetricia et Gynecologica Scandinavica (Suppl. 87): 61-66. 1979.

483. WILHELMSSON, L., LINDBLOM, B., HAMBERGER, L., SAMSIOE, S., HAMMARSTRÖM, S., WIQVIST, N., and SAMUELSSON, B. Endoperoxide, prostacyclin and thromboxane A_2 have a potent stimulatory effect on the human endometrium. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. (To be published by Raven Press)

484. WILLMAN, E.A., COLLINS, W.P., and CLAYTON, S.G. Studies in the involvement of prostaglandins in uterine symptomatology and pathology. British Journal of Obstetrics and Gynaecology 83(3): 337-341. May 1976.

*485. WILSON, P.D. A comparison of four methods of ripening the unfavourable cervix. British Journal of Obstetrics and Gynaecology 85(12): 941-944. December 1978.

486. WILSON, W.B., Jr. Midtrimester abortion with urea, prostaglandin $F_{2\alpha}$, laminaria, and oxytocin: a new regimen. Obstetrics and Gynecology 51(6): 699-701. June 1978.

*487. WINGERUP, L., ANDERSSON, K.-E., and ULMSTEN, U. Ripening of the uterine cervix and induction of labour at term with prostaglandin E_2 in viscous gel. Acta Obstetricia et Gynecologica Scandinavica 57(5): 403-406. 1978.

488. WIQVIST, N., LUNDSTRÖM, V., and GREEN, K. Premature labor and indomethacin. Prostaglandins 10(3): 515-526. September 1975.

489. WORLD HEALTH ORGANIZATION [WHO]. Special programme of research, development and research training in human reproduction. Eighth annual report. Geneva, Switzerland, WHO, December 1979. p. 63, 66-67, 78-81.

490. WORLD HEALTH ORGANIZATION. TASK FORCE ON SEQUELAE OF ABORTION. Gestation, birth-weight, and spontaneous abortion in pregnancy after induced abortion. Lancet 1(8108): 142-145. January 20, 1979.

*491. WORLD HEALTH ORGANIZATION. TASK FORCE ON THE USE OF PROSTAGLANDINS FOR THE REGULATION OF FERTILITY. Comparison of intra-amniotic prostaglandin $F_{2\alpha}$ and hypertonic saline for induction of second-trimester abortion. British Medical Journal 1(6022): 1373-1376. June 5, 1976.

*492. WORLD HEALTH ORGANIZATION. TASK FORCE ON THE USE OF PROSTAGLANDINS FOR THE REGULATION OF FERTILITY. Prostaglandins and abortion. 1. Intramuscular administration of 15-methyl prostaglandin $F_{2\alpha}$ for induction of abortion in weeks 10 to 20 of pregnancy. American Journal of Obstetrics and Gynecology 129(6): 593-596. November 15, 1977.

*493. WORLD HEALTH ORGANIZATION. TASK FORCE ON THE USE OF PROSTAGLANDINS FOR THE REGULATION OF FERTILITY. Prostaglandins and abortion: 2. Single extra-amniotic administration of 0.92 mg. of 15-methyl prostaglandin $F_{2\alpha}$ in Hyskon for termination of pregnancies in weeks 10 to 20 of gestation: an international multicenter study. American Journal of Obstetrics and Gynecology 129(6): 597-600. November 15, 1977.

*494. WORLD HEALTH ORGANIZATION. TASK FORCE ON THE USE OF PROSTAGLANDINS FOR THE REGULATION OF FERTILITY. Prostaglandins and abortion. 3. Comparison of single intra-amniotic injections of 15-methyl prostaglandin $F_{2\alpha}$ and prostaglandin $F_{2\alpha}$ for termination of second-trimester pregnancy: an international multicenter study. American Journal of Obstetrics and Gynecology 129(6): 601-606. November 15, 1977.

*495. WORLD HEALTH ORGANIZATION. TASK FORCE ON THE USE OF PROSTAGLANDINS FOR THE REGULATION OF FERTILITY. Repeated vaginal administration of 15-methyl $PGF_{2\alpha}$ methyl ester for termination of pregnancy in the 13th-20th week of gestation. Contraception 16(2): 175-181. August 1977.

496. WULFF, G. and FREIMANS, M. Elective abortion complications seen in a free-standing clinic. Obstetrics and Gynecology 49(3): 351-357. March 1977.

497. YEUNG, K.K. and PANG, J.C.K. Oral prostaglandins E_2 and $F_{2\alpha}$ in the induction of labour. Australian and New Zealand Journal of Obstetrics and Gynaecology 17(1): 32-35. February 1977.

*498. YLIKORKALA, O. and DAWOOD, M.Y. New concepts in dysmenorrhea. American Journal of Obstetrics and Gynecology 130(7): 833-847. April 1, 1978.

499. YLIKORKALA, O. and JARVINEN, P.A. Comparison between intra-amniotic administration of prostaglandin $F_{2\alpha}$ and its 15-methyl derivative for induction of second trimester abortion. Annals of Clinical Research 9(2): 58-61. April 1977.

500. YLIKORKALA, O., JARVINEN, P.A., PUUKKA, M., and VIINIKKA, L. Abortifacient efficiency of 15(S)15-methyl-prostaglandin $F_{2\alpha}$ methyl ester administered vaginally during early pregnancy. Prostaglandins 12(4): 609-624. October 1976.

501. YLIKORKALA, O., KIRKINEN, P., and JARVINEN, P.A. Intramuscular administration of 15-methyl prostaglandin $F_{2\alpha}$ for induction of labour in patients with intrauterine fetal death or an anencephalic fetus. British Journal of Obstetrics and Gynaecology 83(6): 502-504. June 1976.

502. ZAHRADNIK, H.P., STENGELE, E., KRAUT, E., SCHARPF, G., and BRECKWOLDT, M. Neue Aspekte zur Pathogenese und Therapie der Dysmenorrhoe: Prostaglandin-$F_{2\alpha}$-Spiegel im Menstrualblut. [New aspects in the pathogenesis and therapy of dysmenorrhea: prostaglandin $F_{2\alpha}$ level in the menstrual blood.] [GE] Deutsche Medizinische Wochenschrift 103(32): 1270-1273. August 11, 1978.

503. ZOREMTHANGI, B., AGARWAL, N., PURI, C.P., LAUMAS, K.R., and HINGORANI, V. Evaluation of 15(S) 15 methyl-$PGF_{2\alpha}$ methyl ester suppositories with a two dose schedule for termination of early pregnancy. Contraception 14(5): 519-527. November 1976.

504. ZOREMTHANGI, B., AGARWAL, N., PURI, C.P., LAUMAS, K.R., SARAYA, L.K., and HINGORANI, V. Evaluation of two dose schedules of 15(S) 15 methyl $PGF_{2\alpha}$ methyl ester vaginal suppositories for dilatation of cervix prior to vacuum aspiration for late first trimester abortions. Contraception 15(3): 285-293. March 1977.

505. ZUCKERMAN, H., REISS, U., and RUBINSTEIN, I. Inhibition of human premature labor by indomethacin. Obstetrics and Gynecology 44(6): 787-792. December 1974.

ADDENDA

506. AXEN, U., LINCOLN, F.H., and THOMPSON, J.L. A total synthesis of prostaglandin E_1 and related substances via endo-bicyclohexane intermediates. Chemical Communications, No. 6, March 19, 1969. p. 303-304.

507. BEAL, P.F., 3rd, BABCOCK, J.C., and LINCOLN, F.H. A total synthesis of a natural prostaglandin. Journal of the American Chemical Society 88: 3131-3133. 1966.

508. CORSON, S.L. and BOLOGNESE, R.J. Postpartum uterine atony treated with prostaglandins. American Journal of Obstetrics and Gynecology 129(8): 918-919. December 15, 1977.

509. DE HEMPTINNE, D., THEIRY, M., VROMAN, S., and MARTENS, G. Uterine contractility in spontaneous and induced labour. Zeitschrift für Geburtshilfe und Perinatologie 180(4): 275-278. August 1976.

510. FLYNN, A.M., KELLY, J., HOLLINS, G., and LYNCH, P.F. Ambulation in labour. British Medical Journal 2(6137): 591-593. August 26, 1978.

511. GREENBERG, B.G. [Problems with the design and analysis of statistical studies of abortion and abortifacients.] Testimony before the United States Food and Drug Administration, Obstetrics and Gynecology Advisory Committee, January 30, 1978. 12 p.

512. HELLMAN, L.M. and PRITCHARD, J.A. Williams obstetrics. 14th ed. New York, Appleton-Century-Crofts, 1971. 1242 p.

513. HENZL, M.R. and IZU, A. Naproxen and naproxen sodium in dysmenorrhea: development from in vitro inhibition of prostaglandin synthesis to demonstration of clinical efficacy. Acta Obstetricia et Gynecologica Scandinavica (Suppl. 87): 105-117. 1979.

514. KARIM, S.M.M., and AMY, J.J. Interruption of pregnancy with prostaglandins. In: Karim, S.M.M., ed. Prostaglandins and reproduction. Lancaster, England, MTP, 1975. (Advances in Prostaglandin Research) p. 77-148.

515. KAUL, A.F., FEDERSCHNEIDER, J.M., and STUBBLEFIELD, P.G. A controlled trial of antiemetics in abortion by PGF$_{2\alpha}$ and laminaria. Journal of Reproductive Medicine 20(4): 312-318. April 1978.

516. NIEBYL, J.R., BLAKE, D.A., BURNETTE, L.S., and KING, T.M. The influence of aspirin on the course of induced abortion. American Journal of Obstetrics and Gynecology 124(6): 607-610. March 15, 1976.

517. PAHL, I.R. and LUNDY, L.E. Experience with midtrimester abortion. Obstetrics and Gynecology 53(5): 587-591. May 1979.

518. SCHNEIDER, W.P. The synthesis of (±)-prostaglandins E$_2$, F$_{2\alpha}$, and F$_{2\beta}$. Chemical Communications. No. 6, March 19, 1969. p. 304-305.

519. SCHWARTZ, A., BROOK, I., INSLER, V., KOHEN, F., ZOR, U., and LINDNER, H.R. The effect of flufenamic acid on uterine contractions and plasma levels of 15-keto-13,14-dihydroprostaglandin F$_{2\alpha}$ in preterm labor. Gynecological and Obstetrical Investigation 9(2-3): 139-149. 1978.

520. SOUTHERN, E.M., GUTKNECHT, G.D., and MOHBERG, N.R. Evacuation of the uterus in benign gestational trophoblastic disease with prostaglandins. In: Karim, S.M.M., ed. Obstetric and gynaecological uses of prostaglandins. [Proceedings of the symposium, Singapore, April 27-30, 1976] Baltimore, Maryland, University Park Press, 1976. p. 247-251.

521. TAKAGI, S., YOSHIDA, T., TOGO, Y., TOCHIGI, H., ABE, M., SAKATA, H., FUJII, T.K., TAKAHASHI, and TOCHIGI, B. The effects of intramyometrial injection of prostaglandin F$_{2\alpha}$ on severe postpartum hemorrhage. Prostaglandins 12(4): 565-579. October 1976.

*522. THIERY, M. and AMY, J.J. Perinatal effects of natural prostaglandins used for labor induction. In: Coceani, F. and Olley, P.M., eds. Advances in prostaglandin and thromboxane research. Vol. 4. New York, Raven Press, 1978. p. 307-324.

523. WINGERUP, L., ULMSTEN, U., and ANDERSSON, K.-E. Ripening of the cervix by intracervical application of PGE$_2$-gel before termination of pregnancy with dilatation and evacuation. Acta Obstetricia et Gynecologica Scandinavica (Suppl. 84): 15-18. 1979.

524. ZAHRADNIK, H.P., SCHOENING, R., and BRECKWOLDT, M. Correlations of uterine contractions with PGF$_{2\alpha}$ synthesis in vitro. Presented at the 4th International Prostaglandin Conference, Washington, D.C., May 27-31, 1979. (To be published by Raven Press)

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Population Reports

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July 1980

PREGNANCY TERMINATION

Population Information Program, The Johns Hopkins University, Hampton House, 624 North Broadway, Baltimore, Maryland 21205, USA

Complications of Abortion in Developing Countries

Summary. Today new attention is focusing on the health problems of women. A major cause of death among women of reproductive age in developing countries is illegally induced abortion. Complications of illegal abortion account for 4 to 70 percent of maternal deaths in developing country hospitals and an unknown number of additional deaths outside of hospitals. Illegal abortion can be almost as dangerous as childbirth and in some countries accounts for as many as one of every three or four maternal deaths. One estimate, based on data from the International Planned Parenthood Federation, is that in 65 Asian, African, Middle Eastern, and Latin American countries about 84,000 women die each year from complications of illegally induced abortion. The incidence of abortion seems to be increasing as more women try to avoid unwanted births and keep their families small. Countries that want to improve the health of women of reproductive age and at the same time to reduce the high cost of caring for abortion complications will have to take account of the increasing incidence and the serious hazards of illegal abortion.

Experience from various countries shows that four different approaches can reduce mortality from illegal abortion. These are:

- Encouraging the use of contraception instead of abortion. Risks to health from modern contraceptives are much less than the risks from illegal abortion.
- Legalizing abortion. Risks to health from legal abortion are always lower than from illegal abortion.
- Allowing medically trained practitioners to perform abortions for health reasons. Regardless of the legal status of abortion, risks to health are always lower when abortions are performed by physicians rather than by untrained or traditional practitioners.
- Improving clinical management of abortion complications. For septic abortion, optimum treatment requires immediate evacuation of the uterus, large doses of antibiotics, and close monitoring of fluid balance.

Incidence of Abortion

From 30 to 55 million abortions are estimated to take place annually throughout the world. About half of them are illegal; more than half take place in developing countries. Surveys in some Latin American and Asian countries suggest that as many as one of every three or four women has had an induced abortion. In Africa and the Middle East abortion prevalence seems to be somewhat lower but increasing.

When women are surveyed directly about their abortion experience, from zero to 30 percent admit a previous abortion. When women are asked indirectly, using a survey technique that assures women of privacy, the proportion admitting abortion doubles in almost every study. An even better way to learn the full extent of illegal abortion is by surveying the people who provide abortions; in Korea and Thailand surveys of abortion providers suggest abortion rates 50 to 500 percent higher than do surveys of women. The survey in Thailand also showed that abortion was not limited to urban areas; about one in five pregnancies in rural areas ended in abortion.

Hazards of Abortion

While legal abortion is one of the safest of surgical procedures — with a death rate in the United States of 1.4 per 100,000 procedures, or about 11 times safer than tonsillectomy — illegal abortion in developing countries kills as many as 50-100 women per 100,000 procedures, or one for every 1,000 to 2,000 procedures. Illegal abortion is 10 to 250 times more dangerous than any kind of contraceptive measure, depending on the age of the woman and the method used.

The main reason that illegal abortion is so much more dangerous than legal abortion is that illegal abortions are often performed by unskilled, untrained providers — traditional practitioners or midwives, for example — or perhaps attempted by the woman herself in unhygienic conditions using crude instruments, caustic agents, or toxic potions. Legal abortions, on the other hand, are almost always performed by doctors working in clean surroundings using modern techniques and sterile equipment.

Not only higher death rates but also more complications occur with illegal abortion. Surveys in five Latin American countries

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This issue of **Population Reports** was prepared by Laurie S. Liskin, M.A., on the basis of published and unpublished materials, correspondence, and interviews. Louise Doucette and Linda J. Christie assisted with research. Comments and additional material are welcome.

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Phyllis T. Piotrow, Ph.D., Director; Ward Rinehart, Editor.

show that between 20 and 58 percent of woman required hospitalization after their last abortion (whether spontaneous or induced). Hemorrhage, infection, and shock are the most common major complications of illegal abortion. Twigs and catheters also cause cervical lacerations, uterine and intestinal perforation, and peritonitis. Caustic solutions cause chemical burns. Eating or drinking certain drugs or chemicals causes poisoning or intense vomiting leading to dehydration and death. Of those women with complications of spontaneous and illegally induced abortion who reach hospitals, 5 to 15 per 1,000 die. In some Indian hospitals as many as 300 per 1,000 women with complications of illegally induced abortion die.

Abortion Costs

The cost of illegal abortion in money and other health care resources is high. As much as 50 percent of some maternity hospital budgets are spent on treatment of abortion complications. A study in the Dominican Republic found that treating a complicated abortion case cost more than twice as much as an incomplete but otherwise uncomplicated case and more than 12 times as much as a normal birth. A Chilean physician and colleagues estimated that 87 percent of hospitalization costs for treatment of abortion complications would have been saved if physicians had performed the abortions by dilation and curettage rather than other providers using cruder methods.

In many developing countries women face a difficult choice — a relatively safe procedure that is expensive or a dangerous procedure that is cheaper. An inexpensive abortion can be procured readily from an unskilled provider, but at considerable risk to life and health, while a safer procedure, performed by a physician, may cost over $100 (US) — more than all but a few can pay.

Contraception and Abortion

The experience of abortion often affects women's contraceptive behavior. Women are more likely to use contraceptives after abortion than before, and they are more likely to use effective methods — if these are available. Where abortion is illegal, however, abortion providers usually do not offer contraceptive services. Therefore, hospitals should give special attention to the contraceptive needs of women being treated for abortion complications. There is little evidence that most do.

IUDs, sterilization, and oral contraceptives appear to be as safe and appropriate after abortion as at any other time. Insertion of IUDs after abortion, even septic abortion, has not produced significantly higher complication rates than insertion at other times. Sterilization performed immediately after a legal abortion procedure produces no more complications than sterilization delayed for six weeks after abortion, according to a recent WHO study. Some studies show greater risk when sterilization and abortion are performed together than when either is performed separately, but the different sterilization and abortion techniques used influence the complication rates, making conclusions difficult. Oral contraceptives can be used immediately after any induced abortion.

Promoting effective contraception as an alternative to abortion has reduced abortion mortality in at least one well-documented case. In Chile, a major reason for establishing the family planning program was to reduce mortality from abortion. In the early 1960s, before the program began, contraceptive use among women of reproductive age was only about 3 percent; the birthrate was about 37 per 1,000 population; abortion complications accounted for about one of every five admissions to obstetric services, and abortion mortality was 11.8 deaths per 10,000 live births. By 1978-1979, after more than a decade and a half of family planning programs, contraceptive use had increased to 23 percent; birthrates had declined to 22 per 1,000; obstetric admissions for abortion had fallen to one in eight, and abortion mortality was down to 2.4 deaths per 10,000 live births.

Characteristics of Women Having Abortions

What kind of woman has an abortion? In Asia and the Middle East, she is usually an older, married woman of high parity who does not want to have any more children. In parts of Africa, by contrast, she is often a young, unmarried student without children who turns to abortion because contraceptives are not easily accessible to an unmarried woman and because pregnancy is grounds for expulsion from school. In Latin America, too, young women may be turning to abortion in larger numbers.

Education, urbanization, and social change are putting strong pressures on couples in developing countries to have fewer children. The number of abortions is therefore likely to increase, at least temporarily. If family planning supplies and services are not readily accessible, if trained personnel are not willing to provide safe abortions at affordable prices, and if adequate medical care plus contraceptive services are not available after abortion or after treatment of abortion complications, then the result will be an increasing hazard to maternal health and a heavy burden on already hard-pressed health services.

End of Summary

BACKGROUND

Abortion is one of the oldest methods of preventing unwanted births and until recently one of the most hazardous. Among preliterate people, use of abortion and infanticide exceeded the use of measures to prevent conception (193). The earliest written reference to any method of fertility control, according to Norman Himes in *Medical History of Contraception*, was a recipe for an oral abortifacient. This concoction, which may have included quicksilver, is found in the ancient Chinese medical text written by the Emperor Shen Nung in the period 2737-2696 BC (193).

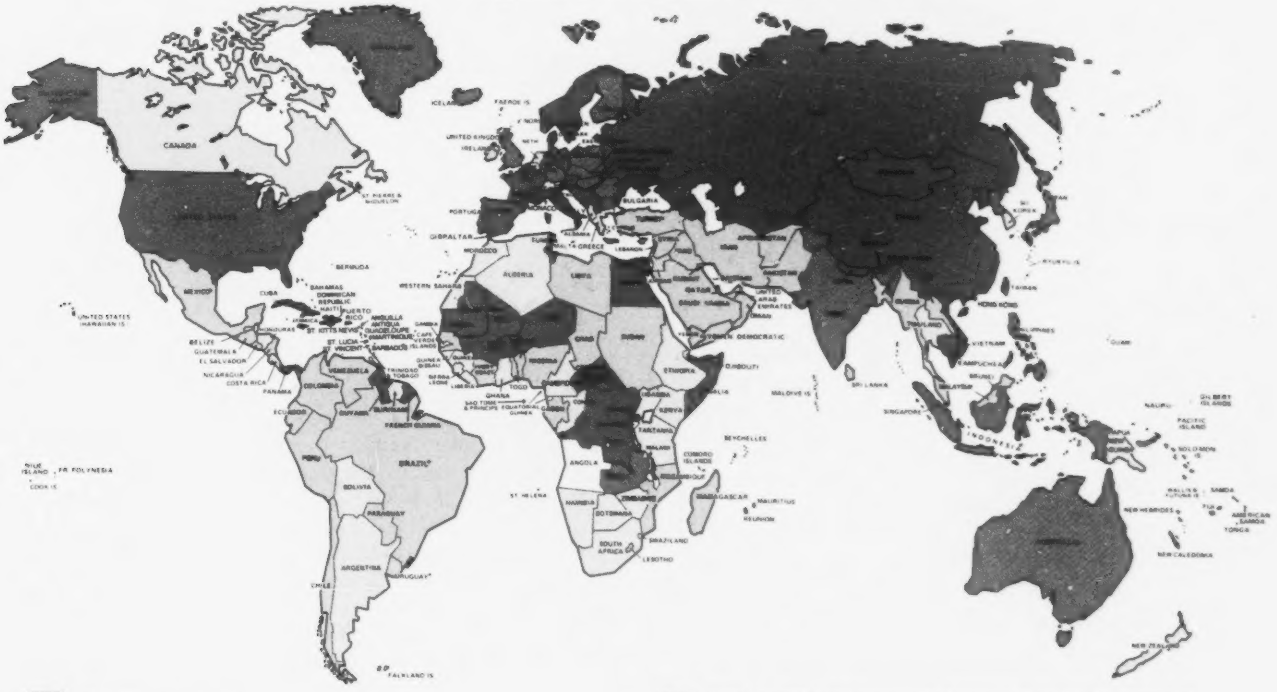
Abortion was common in ancient Greece and Rome. A 1922 review of Greek practices included 12 pages listing abortifacients plus instruments, injections, and medicated pessaries or tampons (292). Hippocrates reportedly advised one woman to jump in the air, striking her heels against her hips, to induce abortion (473). In ancient Rome also abortion was a frequent practice. The methods used included oral agents (usually strong purgatives), douches (often caustic), and curettage (473). Although there are no data to determine the hazards — or the efficacy — of these methods, clearly they were risky. Purgatives and caustic agents were often administered until either abortion or death resulted. As a result of curettage procedures, perforation and sepsis were not uncommon (473).

Religious criticism of abortion is noted in the Old Testament but became stronger in the Christian era (335, 426). During the Middle Ages abortion was condemned and, as the procedure was performed in secret, medical information about methods and complications was not readily available. Drugs and herbs were widely used, especially materials from trees that did not bear fruit, such as the willow (473). Ergot, from fungus on cereal plants, was used both to hasten labor and to induce abortion; for abortions five or seven grains were recommended (38). Until very recently little distinction was made between drugs that were believed to cause sterility and those which were believed to provoke abortion. The limited information available suggests that these abortifacients were usually not effective, and, if they were effective, they were also toxic to the woman.

Legal Status

Under principles of common law, inducing abortion before quickening — that is, before the first perceptible movements of the fetus — was not an offense (278, 291). In fact, early abortion

Figure 1. Legal Status of Induced Abortion, 1980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TONGA
NEW HEBRIDES
NEW CALEDONIA
AUSTRALIA
NEW ZEALAND
NIUE ISLAND
FR. POLYNESIA
COOK IS.

▩ **Illegal for any reason**[a]

☐ **Legal only to save woman's life**

▨ **Legal only to preserve woman's health or also in cases of rape or incest and/or fetal indications**

▧ **Legal for social and sociomedical reasons as well as for reasons of woman's health, rape or incest, and/or fetal indications**

■ **Legal, grounds not specified**

[a] Abortion to save women's life may be authorized under general principles of criminal law.

[b] Legal to save women's life and in cases of rape

[c] Legal to save women's life, in cases of rape, and for fetal indications

[d] Abortion permitted for fetal indications and, under general provisions of criminal law, to preserve the woman's life and health

[e] Legal to save women's life and in cases of rape or incest, but in other cases penalty for first trimester abortion may be waived because of serious economic hardship

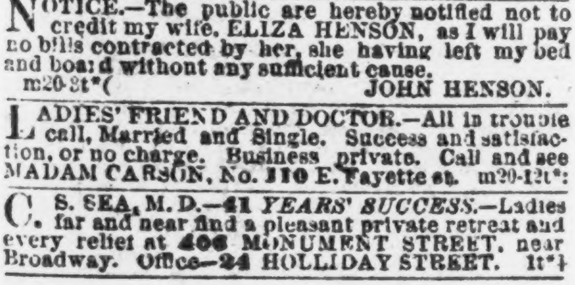
Source: Tietze (589), UNFPA (501)

was often viewed as nothing more than bringing on delayed menses. Even abortions in the second trimester of pregnancy or later were rarely considered cause for legal action (291). More often they were regarded as a desperate but understandable alternative for unfortunate girls or women who became pregnant out of wedlock (291).

Throughout the 19th century, however, in Europe and the United States abortion became more common as married women began to try to limit family size (278, 291). Many unlicensed practitioners openly advertised the abortion services they provided (see photograph, this page). Home medical manuals often discussed ways to bring on delayed menses, sometimes called "stoppages." Oil of juniper was widely recommended (367). A study of 2,000 women in Manchester, England, in the 1890s found a ratio of one abortion to 7 births, and a German study estimated one abortion in 8 to 10 term deliveries (367). Abortion mortality was unmeasured but probably high (367).

During the 19th century, as abortion became more common and widely publicized, the dangers of the procedure also received more attention. At the same time, scientific research indicated that embryonic development was a continuous process in which quickening was only one stage (291). To protect women from injury and to discourage abortion as a practice, many Western nations began to enact restrictive abortion legislation. The first change in the common law doctrine came in an 1803 consolidation of the British penal code which included penalties for abortion before quickening or by poisoning (291). In France in 1810 the Napoleonic Code stipulated 5 to 10 year prison terms both for women having abortions and abortion providers. By 1861 Britain had amended abortion laws further to make both the woman and the abortion provider subject to imprisonment for abortion before quickening. In the US by 1868 almost all states had passed laws restricting abortion; these laws were prompted more by medical doctors trying to strengthen their professional status than by religious opposition to abortion (291).

The 19th century change from a permissive approach to criminal penalties against persons performing abortion influenced the legal status of abortion in many European colonies. As a result, many developing countries, with the exception of Tunisia, Zambia, India, Singapore, China, Cuba, and Vietnam, still carry in their penal codes restrictive abortion laws similar to those enacted in Europe toward the end of the last century (196, 483).



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Nineteenth century abortion providers openly advertised their services in US newspapers. The March 20, 1867, edition of the *Baltimore Sun* carried thinly disguised advertisements for Dr. Sea, a medically trained practitioner, and Madame Carson, a folk practitioner.

Beginning in the last few decades, however, the 19th century laws have been modified in various ways. The trend is toward less restrictive legislation. Since 1950 more than 30 countries have amended legislation to permit abortion for social or sociomedical reasons, while five have enacted prohibitions (121, 483, 544). These five, mainly Communist countries in Eastern Europe, are trying to promote population growth. The major justifications given for legalizing abortion are concern for the health and welfare of the woman, and, in the US Supreme Court decisions of 1973, an individual's right of privacy (483, 507, 508). A few countries, such as Singapore and Tunisia, also cite the need to reduce population growth (483). The major opposition to legal abortion in countries where restrictions have been questioned or lifted comes from conservative groups, mainly on moral and religious grounds (483). As Figure 1 shows, in about 10 percent of countries abortion is now legal under any circumstance; in about 45 percent of countries abortion is legal either to protect the woman's health or for health and other reasons including rape, incest, and possible fetal deformity or disease, and broad sociomedical indications; and in another 45 percent abortion is either completely illegal or permitted only to save the woman's life.

Ironically, both in the 19th century, when legislation restricting abortion was enacted, and in the past three decades, when legislation revising some of these restrictions was enacted, legal attention focused on the same question: the safety of the procedure. As Cyril Means puts it with respect to the New York law,

> It is thus curious but true that both the Revisers of 1828 and the revisers of 1961-65 give one and the same reason, and no other, for their respective proposals to the legislature: danger to the woman. There is one salient difference, however. In 1828, all pre-quickening abortions were, if nonfatal, non-criminal; but all were dangerous, even those performed in hospitals by licensed surgeons. In 1965, *e contrario* all but a few pre-quickening abortions were criminal, while any such abortions performed in hospitals by licensed surgeons were extremely safe. (278)

Worldwide Incidence

Despite intense interest in and controversy over abortion law and policy, there are no reliable worldwide data or even generally accepted estimates of the number of abortions that take place annually. Estimates range from 30 million in the mid-1960s (232) to 55 million in the mid-1970s (211). In 1979 the Population Crisis Committee suggested a figure of 40 million abortions annually, about half legal and half illegal (364). Estimates gathered from family planning associations in the mid-1970s by the International Planned Parenthood Federation totaled about 16 million abortions, mostly illegal, in 65 countries of Asia, Africa, the Middle East, and Latin America (210). In the late 1970s Christopher Tietze counted about 2 million legal abortions but did not include less reliable data from Japan, which may have 3-5 million abortions; the USSR, about 10-13 million (483); and China, anywhere from 5 to 20 million (211, 383, 483).

Estimates of the number of abortions in China, which would account for a large proportion of legal abortions worldwide, are particularly uncertain because they depend on fragmentary regional figures (11, 127, 140, 215, 228, 483, 555, 573). A 1978-1979 study by Katherine Lyle in the industrial municipality of Tientsin, for instance, revealed about 65 abortions for every 100 live births (555), a figure which, if projected nationally, would total about 12 million abortions. By contrast, 1977 data gathered by Pi-Chao Chen in Guangdong Province would, if projected nationally, suggest about 5 million legal abortions (555).

This issue of *Population Reports* deals primarily with the impact of illegally induced abortion on the health of women, especially in developing countries, with the medical treatment of abortion complications, and with contraceptive use and abortion. Legal and demographic aspects of abortion are not discussed except as necessary to measure and assess potential risks to the life and health of women.

RISKS TO LIFE AND HEALTH

When performed by competent providers in aseptic conditions, abortion is a relatively safe procedure, the short-term risks of which can be easily measured. When performed by inexperienced people or under unhygienic conditions, as is often the case with illegal abortion, then mortality, morbidity, and long-term complications are much greater, and, at the same time, much more difficult to evaluate fully.

In addition to the general health of the individual woman, four major factors determine the mortality and morbidity from both legal and illegal abortion:

- the method of abortion
- the skill of the provider
- the duration of pregnancy
- the accessibility and quality of medical facilities to treat complications of abortion.

Theoretically, the far greater mortality and morbidity of illegal than of legal abortion should be attributable to differences in these four factors. But because data on illegal abortions are so difficult to gather, it is difficult to determine which factors contribute most to the higher risks of illegal abortion.

TERMS USED IN ABORTION RESEARCH

Abortion
The termination of a pregnancy before the fetus is capable of extrauterine life (medical definition).

Induced abortion
Deliberate interference with a pregnancy, with the intention of terminating it, by the pregnant woman herself or by another person.

Spontaneous abortion
All abortions not induced are spontaneous even if an external cause such as trauma or disease is involved. Also called miscarriage.

Septic abortion
Abortion that is followed by infection. The majority of septic abortions are thought to be induced, but infection can occur after spontaneous abortion.

Incomplete abortion
The presence of retained products of conception in the uterus after a spontaneous or induced abortion. Incomplete abortion is the most common diagnosis when women are hospitalized for abortion complications.

Abortifacient
A drug or other substance used to cause a pregnant woman to abort.

Abortion Measurements

Abortion is usually measured by **rates,** which relate numbers of abortions to population, or by **ratios,** which relate the number of abortions to the number of events such as live births, deliveries, or pregnancies.

Prevalence rate
The proportion of women who have had one or more abortions in their lifetimes, usually expressed as a percentage. This is the most common measurement reported by surveys.

Abortion rate (Incidence rate)
The number of abortions in a given period, usually a year, relative to a whole population or to a population of women. This measure of incidence is usually expressed as a number of abortions per 1,000 women of reproductive age, 15-44 or 15-49. Incidence rates can also be age- or parity-specific.

Hospitalized abortion rate
The number of women hospitalized in a given period, usually one year, for abortion complications relative to the population of all women or of women of fertile age in a specific area.

Abortion ratio
The number of abortions relative to the number of live births, pregnancies, or deliveries in a given period, usually one year, expressed as the number of abortions per 1,000 events. Sometimes ratios are reported as the number of abortions in women's lifetimes per 1,000 lifetime live births.

Abortion mortality ratio
The number of deaths associated with or attributed to abortion per 100,000 abortions (also known as a death-to-case rate). When complete data are not available, the ratio is often expressed as the number of in-hospital deaths attributed to abortion per 1,000 cases of abortion complications.

Abortion mortality rate
The number of deaths associated with or attributed to abortion per 100,000 women of fertile age.

The distinction between rates and ratios is important, as the following example shows. Assume two countries, each having a population of one million; women in one country have 9,000 abortions and 45,000 live births in a year and women in the other have 6,000 abortions and 15,000 live births. The first country will have an abortion rate of 9 per 1,000 population and an abortion ratio of 200 per 1,000 live births. The abortion rate in the second country will be 6 per 1,000 population, and the ratio, 400 per 1,000 live births. Thus, one country has a higher abortion rate while the other has a higher ratio. The lower birthrate (denominator) in the second country yields the higher abortion ratio (483).

Source: Grebnik & Hill (173), International Planned Parenthood Federation (207), Moore-Čavar (299), Tietze (483), World Health Organization (532)

Mortality

Even without trying to determine direct and indirect causes, simply measuring mortality due to illegal abortion is difficult enough. Based on a computer model simulating reproductive events, Christopher Tietze has estimated that where most abortions are either self-induced or performed by unskilled providers in areas with poor medical care systems, mortality from illegal abortion may be as high as 1,000 deaths per 100,000 illegal procedures (or 1 per 100 procedures). In most countries, Tietze estimates, mortality, while still high, is probably much lower — no more than 50 to 100 deaths per 100,000 illegal abortions (or one per 1,000 to 2,000 procedures) (483).

To calculate directly abortion mortality ratios (sometimes called death-to-case rates), two sets of data are necessary: (1) the number of abortion deaths in a given area during a specific period and (2) the total number of abortions performed in the same area during the same period, which serves as a denominator. In the case of illegal abortion, it is impossible to determine precisely either the number of abortions or the number of deaths in any area. Therefore most estimates are derived from rough approximations of either abortions or deaths, which are multiplied by estimated rates or ratios derived from other data. For example, based on the IPPF estimate of 16 million abortions, mostly illegal, occurring in 65 coun-

Table 1. Deaths in Hospital Attributed to Complications of Induced and Spontaneous Abortion as a Proportion of All Maternal Deaths in Hospital, Selected Developing Country Studies, 1969-1979

Region & Country	Ref. No.	Period & Place of Study	No. of Maternal Deaths Attributed to Abortion Complications	% of Maternal Deaths Attributed to Abortion Complications
AFRICA				
Nigeria	340	Jan. 1962-Dec. 1971, University College Hospital, Ibadan	12	6.6
	13	1966-1972, Lagos University Teaching Hospital	18	51.4
		1966-1972, Lagos Island Maternity Hospital	63	6.1
Sierra Leone	597	1970-72, Maturity and Connaught Hospitals, Freetown	13	10.7
Uganda	174	July 1966-June 1967, all hospitals/maternity centers with facilities for delivery	15	3.6
ASIA				
Bangladesh	95	Dec. 1967-Nov. 1968, field surveillance, Matlab Thana	3	7.3
India	379	1960-1972, Government Erskine Hospital, Madurai	101	8.1
	223	Jan. 1977-Dec. 1978, Government Erskine Hospital, Madurai	33[a]	26.6
	351	1973-1977, LNJP Hospital, New Delhi	17[a]	21
	446	1976, Eden Hospital, Calcutta	13[b]	15.7
Malaysia	333	Mar. 1968-Feb. 1974, University Hospital, Kuala Lumpur	4	30.8
MIDDLE EAST				
Iran	119	1963-1969, Saadi Hospital, Pahlavi University, Teheran	7	7.3
Iraq	161	1964-1970, Karkh Maternity Hospital, Baghdad	5	9.4
WESTERN HEMISPHERE				
Brazil	355	1955-1977, Hospital das Clinicas, Faculdade de Medicina de Ribeirão Prêto	30	44.1
			30	44.1
Chile	167	1968, All hospital discharge records	NA	39.7
	545	1963-1973, National Health Service hospitals	2,523	37.4
Colombia	572	1970-78, Maternal and Child Instistute, Bogatá	239[a]	40.3
Jamaica	203	1971, Victoria Jubilee Hospital, Kingston	5	33.3
Venezuela	4	1973, Concepción Palacios Maternity Hospital, Caracas	NA	70

[a] Mortality due to septic abortion only
[b] Illegal induced abortions only

tries in Africa, the Middle East, Latin America, and Asia and an estimated mortality ratio of 500 deaths per 100,000 illegal abortions (or one per 200 procedures), Roger Rochat inferred that in these countries close to 84,000 women die every year from complications of illegally induced abortions (396).

Because of the lack of better data, information about illegal abortion mortality is sometimes derived indirectly or partially derived from two sources: hospital records and death certificates. Both sources are highly inaccurate. Hospital records rarely distinguish between spontaneous and illegally induced abortions; thus mortality from illegally induced abortions alone cannot be specifically determined. (Complications from spontaneous abortions are rarely fatal, however, so most abortion-related hospital deaths presumably follow illegally induced abortions (484).) Furthermore, hospital records underestimate the total number of deaths from abortion since they exclude women who die outside of hospitals. Mortality figures derived from death certificates are also underestimates because they exclude many concealed or misregistered abortion deaths (366, 484). (See box, "Problems of Data Sources," p. F-137).

The following measures are used to estimate death from abortion in developing countries:

- hospital abortion deaths as a proportion of all maternal deaths occurring in hospitals
- abortion deaths per 1,000 hospital admissions for abortion complications
- annual number of registered abortion deaths as a proportion of all maternal deaths on registered death certificates
- maternal and abortion deaths per 10,000 live births.

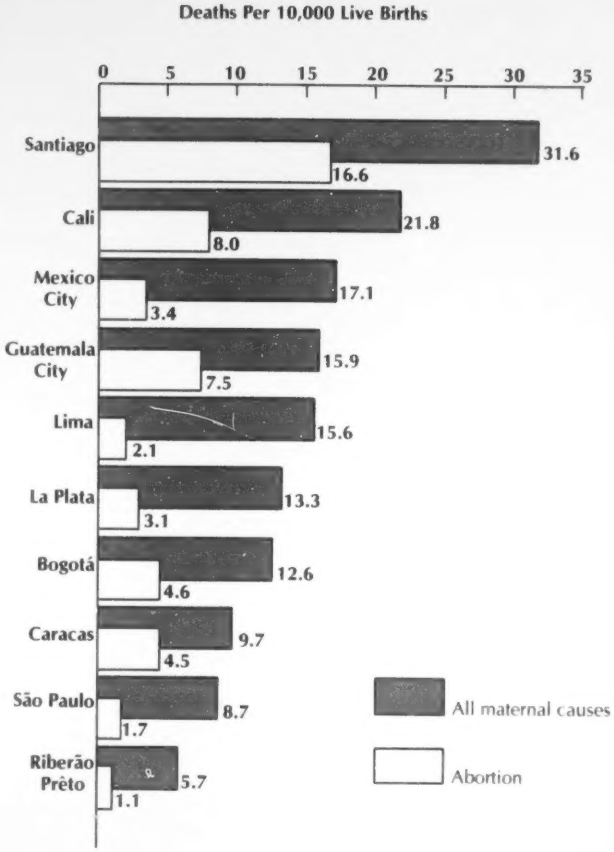
None of these measures can be extrapolated to a mortality estimate for a total population, but they do suggest the magnitude of the risk.

As Table 1 shows, abortion is a major cause of maternal mortality in developing countries. In Latin America, where research has been most extensive, even though abortion is illegal everywhere, over 30 percent of maternal deaths in a number of hospitals are due to abortion complications (2, 167, 203, 355). In Chile, for example, abortion deaths in national health service hospitals from 1963 to 1973 ranged from 30 to 41 percent of all reported maternal deaths (545). In Colombia, septic abortions alone caused 40 percent of all maternal deaths in the Maternal and Child Health Institute in Bogotá between 1970 and 1978 (572). In Asia and Africa, hospitals report that abortion causes between 4 and 51 percent of all maternal deaths (see Table 1).

Abortion mortality in hospitals is sometimes measured in relation to the number of women admitted to hospitals for abortion complications. These ratios range from zero to about 300 deaths per 1,000 admissions for abortion complications (see Table 2). In Santiago, Chile, during the 1960s approximately 5 women died for every 1,000 women admitted for abortion complications (518). Similar ratios are reported in other Latin American urban hospitals (37, 130, 392, 512) as well as in African and Asian hospitals. Exceptions are hospitals in Bangladesh, Nigeria, and Sierra Leone, which have reported mortality ratios as high as 12.5 to 19.4 per 1,000 admissions for abortion complications (13, 25, 44, 52).

Since hospital admissions for abortion complications include women with either spontaneous or induced illegal abortions and since spontaneous abortion is less likely to be life-threatening than illegal abortion, these hospital mortality ratios underestimate mortality from induced illegal abortions. Hospitals in India, Colombia, and Thailand, however, report mortality among women with admitted or presumed illegal abortions only, and these ratios are very high, ranging from 8 to 307 deaths per 1,000 admissions for complications of illegal abortion (51, 94, 223, 269, 360, 568, 569).

Figure 2. Rates of Maternal Mortality Due to Abortion and Due to All Causes, 10 Latin American Cities, 1962-1964



Source: Puffer & Griffith (1967)

Death certificates confirm these hospital data. As Table 3 shows, between 1970 and 1978 abortion complications as recorded on death certificates caused 20 percent or more of all maternal deaths in eight countries — Argentina, Chile, Cuba, Mauritius, Nicaragua, Singapore, Trinidad and Tobago, and Uruguay. These percentages can be misleading; in countries where overall maternal mortality is low, a few deaths attributed to abortion may constitute a large proportion of all maternal deaths. Also, many deaths are not registered at all.

Information on abortion deaths and on all maternal deaths in relation to the number of live births comes solely from Latin America (see Figure 2, this page). In the period 1962-1964, maternal mortality ranged from 5.7 deaths per 10,000 live births in Riberão Prêto, Brazil, to 31.6 deaths per 10,000 live births in Santiago, Chile. Mortality from abortion accounted for 34 percent of all maternal deaths in the 10 Latin American cities studied (371). In three cities, Santiago, Caracas, and Guatemala City, abortion caused close to half of all maternal deaths (371).

Table 2. Deaths in Hospital Attributed to Complications of Induced or Spontaneous Abortion as a Proportion of All Hospital Admissions for Complications of Abortion, Selected Developing Country Studies, 1965-1979

Region & Country	Ref. No.	Period & Place of Study	No. of Admissions for Abortion Complications	No. of Deaths due to Abortion Complications	No. of Deaths per 1,000 Admissions for Abortion Complications
AFRICA	296	Oct. 1977-Jan. 1978, 7 hospitals in 7 African capital cities	1,861[a]	10	5.3
Ghana	25	1970-1972, Korle Bu Hospital, Accra	9,457	46	4.9
Kenya	275	1971, 1974, 1975, Kenyatta National Hospital, Nairobi	6,956	19	2.7
Mauritius	25	1970-1972, Civil Hospital	2,372	20	8.4
		1970-1972, Victoria Hospital	2,289	30	13.1
		1970-1972, 7 rural hospitals	1,516	19	12.5
Nigeria	13	1966-1972, Lagos University Teaching Hospital	1,238	18	14.5
		1966-1972, Lagos Island Maternity Hospital	14,150	63	4.5
	242	1972, Lagos Island Maternity Hospital	1,990	8	4.0
Sierra Leone	25	1970-1972, Maternity and Connaught Hospitals	670	13	19.4
Uganda	266	1967-1969, Mulago Hospital, Kampala	5,468	11	2.0
	25	1970-May 1972, Mulago Hospital	5,126	9	1.8
		Nov. 1973-Nov. 1974, Mulago Hospital,	1,377[b]	3	2.2
Zaire	25	1972, Mama Yemo Hospital, Kinshasa	3,182	11	3.5
ASIA					
Bangladesh	52	1978, Chittagong Medical College Hospital	640	8	12.5
	44	May 1977-Sept. 1977, Dacca Medical College Hospital	479	6	12.5
India	51	Feb. 1970-1972, S.S.G. Hospital, Baroda	75[c]	3	306.7
	94	Jan. 1972-Dec. 1973, Nilratan Sircar Medical College and Hospital, Calcutta	221[c]	34	153.8
	233	1974-1979, Kasturba Hospital, Delhi	317[d]	20	63.1
	269	July 1969-Dec. 1971, "P.G.I.," Chandigarh	88[d]	12	136.4
		July 1973-Dec. 1975, "P.G.I.," Chandigarh	133[d]	23	172.9
	360	1971-1973, Government Erskine Hospital, Madurai	393[e]	79	201.0
	379	1960-1972, Government Erskine Hospital, Madurai	2,045[f]	95	46.5
	223	Jan. 1977-Dec. 1978, Government Erskine Hospital, Madurai	380[e]	33	86.8
Indonesia	47	1972-June 1974, Department of Ob/Gyn, University of Indonesia, Jakarta	1,069	6	5.6
Malaysia	479	1960-1972, government hospitals, peninsular Malaysia	142,795	259	1.8
Thailand	568, 569	1968-76, Siriraj Hospital, Bangkok	3,188[f]	25	7.8
	235	Jan. 1972-Dec. 1973, Siriraj Hospital	3,530	3	0.86
	381	May 1969-Feb. 1970, Ramathibodi Hospital, Bangkok	144	1	6.9
MIDDLE EAST					
Egypt	47	1971-1973, Kasr-El-Aini Hospital, Cairo	736	0	0
	222	1969, Kasr-El-Aini Hospital, Cairo	1,620	1	0.6
	137	1973, Tanta University Hospital	913	8	8.8
	136	[1973-74], El Galaa Hospital, Cairo	388	1	2.6
Kuwait	576	1973-1977, Kuwait Maternity Hospital	21,018	2	0.1
Lebanon	54	1961-1971, American University Hospital, Beirut	3,190	15	4.7
Sudan	410	Mar.-Dec. 1974, 3 hospitals, Khartoum	1,191	0	0

[a] Sample selected from a total of 19,594 admissions
[b] Excludes patients admitted on weekends or public holidays
[c] Induced
[d] Induced septic
[e] Septic
[f] Illegal

Table 2 (Cont.)

Region & Country	Ref. No.	Period & Place of Study	No. of Admissions for Abortion Complications	No. of Deaths due to Abortion Complications	No. of Deaths per 1,000 Admissions for Abortion Complications
WESTERN HEMISPHERE					
Chile, Colombia, El Salvador, Guatemala	146	Feb. 1974-May 1975, various hospitals	5,470	16	2.9
Brazil	327	1944-1962, Ob/Gyn department of unidentified hospital, São Paulo	2,016	74	36.7
Chile	513	May-Oct. 1974, Felix Bulnes Hospital, Santiago	602	1	1.7
Colombia	37	1968-1969, 11 hospitals	6,292	20	3.2
	392	Feb. 1974-Mar. 1975, 9 hospitals	2,923	14	4.8
	130	Jan. 1969-Dec. 1971, University Hospital of Barranquilla	4,106	20	4.8
	512	Jan. 1966-Dec. 1969, Caldas University Hospital	1,229	3	2.4
	572	1970-78, Maternal and Child Institute, Bogotá	54,705 2,020[a]	257 210	4.7 104

[a]Septic

Mortality data from countries where abortion is legal are usually more complete but may still underestimate both the number of abortions performed and subsequent deaths (299, 367). It is clear, however, that mortality from legal abortion is much lower than mortality from illegal abortion (536). In the United States the mortality ratio for legal abortion is lower than for any other surgical procedure (81). The United States Center for Disease Control (CDC) reported 15 deaths associated with legal abortion in 1977, for a mortality ratio of 1.4 deaths per 100,000 legal abortions (502), compared with 12 maternal deaths from all causes per 100,000 live births in 1972 to 1975 (83), and 16 deaths per 100,000 tonsillectomies in 1977 (125, 506). In Cuba, where abortion is now legal and freely available in most hospitals, the mortality ratio for hospital abortions from 1968 to 1974 was 1.0 per 100,000 abortions (196, 483).

The difference in mortality that the legal status of abortion may make can be seen most clearly in countries that have changed their abortion laws. In the United States abortion was legalized nationwide in 1973. In 1972, 90 women died from postabortion complications; in 1974, 53 (502). The difference was due almost entirely to a decline in deaths from illegal abortion (82). In England and Wales, before passage of the less restrictive Abortion Act in 1967, approximately 50 abortion-related deaths were reported annually; in 1978 only 5 such deaths occurred (256). A decline in mortality after legalization of abortion has also occurred in developing countries. Singapore liberalized its abortion legislation in 1970 and in 1974 made abortion available on request. Despite large increases in the number of abortions performed annually after 1974, abortion deaths dropped from 51 in 1968-1970 to 26 in 1974-1976. The decrease was due to fewer illegal abortions (258). By contrast, in Romania tightening of the abortion law in October 1966 caused an increase in the number of deaths attributed to abortion from 64 in 1965 to 170 in 1967, with further increases to 432 in 1976 (483, 533, 534).

Morbidity

Complications of abortion are more difficult to measure than mortality but of course far more common — sometimes very common. In a 1962 Chilean survey, for example, 4 in every 10 women aborted by catheter reported that they were later hospitalized for treatment (35). According to more recent surveys in El Salvador, Guatemala, Paraguay, Chile, and Brazil, between 20 and 48 percent of the women who had ever had abortions required hospitalization after their last spontaneous or induced abortion (31, 124, 307, 316, 361, 422). While comparisons among studies are difficult, it is apparent that the same factors that influence abortion mortality — method, provider, duration of pregnancy, and availability of later care — also influence abortion morbidity.

Worldwide, the most frequent complication of legal and illegal abortion is incomplete abortion, or retained products of conception (482), which requires evacuation of the uterus. The most frequent major complications of illegal abortion are pelvic infection, hemorrhage, and shock (536). Another very frequently reported complication is trauma to the pelvic organs — cervical lacerations, uterine perforation, and damage to the bladder and intestines. In sub-Saharan Africa and India, tetanus is a major complication and is usually fatal (10, 15, 16, 25, 51, 269, 378).

The method for inducing abortion influences both the extent and the type of complications. The types of drugs and techniques used to attempt illegal abortion are many, ranging from herbal teas to modern surgery, and each has its own dangers. Potassium permanganate tablets and other chemical substances inserted into the cervical os cause chemical burns and bleeding and may even lead to the formation of bladder or rectal fistulas (367, 426). Abdominal massage, which is practiced in Southeast Asia, Africa, and the Middle East, can cause internal bleeding and organ damage (116, 156, 312, 415).

Table 3. Registered Deaths Attributed to Complications of Induced and Spontaneous Abortion as a Proportion of All Registered Maternal Deaths, Annual Average Based on Death Certificates, 1970-1978*

Region & Country	Average Annual No. of Registered Deaths Attributed to Abortion Complications	Average Annual Percentage of All Registered Maternal Deaths Attributed to Abortion Complications
AFRICA		
Mauritius	14	46
ASIA		
Hong Kong	1	12
Philippines	120	7
Singapore	4	35
Thailand	102	8
MIDDLE EAST		
Egypt	65	6
Kuwait	1	8
WESTERN HEMISPHERE		
Argentina	188	28
Chile	127	36
Colombia	213	19
Costa Rica	6	18
Cuba	25	20
Dominican Republic	9	6
El Salvador	16	10
Guatemala	33	9
Jamaica	7	9
Mexico	176	6
Nicaragua	5	39
Panama**	5	13
Paraguay	25	17
Peru	63	6
Trinidad and Tobago	14	39
Uruguay	8	21
Venezuela	68	19

*Not all years available for all countries
**Does not include Canal Zone

Source: Tietze (589)

Mechanical methods — the insertion of a twig or other object into the cervix — may lead to uterine and intestinal perforation and subsequent peritonitis (266, 360). Other nonmedical methods to induce abortion include eating or drinking quinine, laundry bluing, or any of a host of other chemicals. These can lead to poisoning, renal failure, or intense vomiting causing dehydration, and eventual death unless proper therapy is instituted (168, 170).

Inserting a foreign object, sometimes a urinary catheter, or *sonda*, into the vagina and cervix may be the most common method of illegal abortion worldwide (483). A survey in Santiago, Chile, found that this method was more likely to lead to hospitalization than any other (35) (see Table 4). The least dangerous method, according to this study, was curettage, generally used only by physicians and graduate midwives. The nonmedical abortion provider and the pregnant woman herself were more likely to use a catheter (35).

Even in countries where abortion is legal and complication rates are much lower, the method used affects complication rates. A large study by the Joint Program for the Study of Abortion and the Center for Disease Control (JPSA/CDC) in the US found that curettage during the first trimester of pregnancy is the safest abortion technique. Of curettage techniques, suction curettage (vacuum aspiration) caused fewer major complications than sharp curettage (D&C). Other techniques used later in pregnancy, such as instillation of substances into the uterus and major surgical procedures such as hysterotomy and hysterectomy, have higher major complication rates (175).

The legal status of abortion in a country usually influences the specific abortion technique used and thus the subsequent risks to the woman. Where abortion is legal, the safest effective technology that is available can be employed. Where abortion is illegal, the choice of method is much more limited by a woman's ability to learn of providers, the type of provider accessible, the means at the provider's disposal, and the cost of the procedure. As a result safety considerations often play little part in determining the method of illegal abortion.

The medically trained abortion provider is likely to use safe and effective methods, particularly suction or sharp curettage. Even where abortion is illegal, physicians can perform relatively safe procedures. In the urban areas of Tanzania, for example, many abortions are induced by physicians in their private offices. Using sterile instruments, they rupture the amniotic sac and then instruct the woman to report to a hospital as soon as bleeding has begun for treatment of an incomplete abortion. In these circumstances, infection is rare (434). Similar practices undoubtedly prevail in many other developing countries.

Skilled practice and safety precautions are not the province of physicians only. In rural Thailand, a survey of 81 abortion providers, none of whom were physicians, found that one-third routinely give their clients antibiotics, thereby reducing the likelihood of sepsis (478). In several hospitals in Brazil fewer women have been hospitalized for septic abortion in recent years in part because the trained midwives, who perform most illegal abortions, have grown more skilled and experienced and now give their clients antibiotics after the procedure (117, 263).

Yet, on the whole, abortions performed by nonphysicians are more hazardous than abortions by physicians, whether legal or illegal. The untrained provider or traditional practitioner is likely to use traditional methods of varying safety and efficacy. Generally, traditional methods that are potentially dangerous to the woman may be either effective or ineffective in inducing abortion, but those that are safe are rarely effective.

Morbidity varies with the duration of gestation. A study of 1,890 women in Santiago, Chile, found that 47 percent of abortions performed in the third to fifth months of pregnancy led to hospitalization, compared with 18 percent of abortions performed in the first month of pregnancy (35). Similarly, in the US, complication rates of legal abortion in the second trimester, as assessed in the JPSA/CDC study, were four to five times higher than complications in the first trimester (175). Mortality as well as morbidity associated with legal abortion increased with length of gestation, from 1.7 deaths per 100,000 abortions in the 9th and 10th weeks to 14.6 in the 16th to 20th weeks (502).

Although complication rates for illegal abortion cannot be determined because of the lack of data, some suggestion of the extent of complications, like the extent of mortality, can be obtained by observing changes in hospital admissions for septic or incomplete abortions in areas that have eased restrictions on abortion. In New York City, for example, where abortion laws were made less restrictive in 1970, hospitals reported a decline of nearly 50 percent in admissions due to incomplete abortions, from 6,524 in 1969 to 3,253 in 1973 (299). Similar declines in hospital admissions for postabortion complications have been reported in other cities in the United States (221, 245, 437), in Yugoslavia (588), and in England (455).

Long-Term Complications

The fear is often expressed that abortion, even when performed by a physician, may have adverse effects subsequently, for example, by increasing the risk of spontaneous abortion (565). Whether this is true is difficult to determine. As in studying other potential hazards of abortion, there is a great difference between studying long-term complications of legal abortions (or those performed by medical practitioners) and of illegal abortions performed by unskilled persons. Long-term complications of legal abortion have been studied extensively with conflicting results. The most recent research suggests that increased risks of subsequent fertility problems after legal abortion are probably confined to nulliparous women, women having repeat abortions, or women aborted using techniques that may injure the cervix. By contrast, no systematic studies have measured the long-term complications of illegal abortion, but anecdotal evidence indicates that not only fertility but also other aspects of a woman's health may be seriously impaired in the long term by illegal abortion.

Some studies of legal abortion suggest that abortions may affect subsequent pregnancies by increasing the risk of prematurity, ectopic pregnancy, spontaneous abortion, or low birth weight infants (42, 131, 262, 304, 394, 442, 579, 580, 587, 585). Others have failed to find any association with fertility problems (561, 562, 567, 587). The risks, if any, may be greater with repeat abortions (42, 538, 565, 585). For example, a WHO study in one Asian and seven European countries compared subsequent pregnancies of women who had had two or more abortions with those of women who had had one or no abortions. Repeat abortion was associated with a 2½ times higher rate of low birth weight infants and infants of less than 37 weeks gestation (538).

The abortion technique used and whether or not a woman has previously given birth, along with the number of abortions she has had, may influence the risk of miscarriage in future pregnancies. A recent study from Walnut Creek, California, found that abortion did not lead to greater risk of spontaneous loss either in the first trimester or among parous women. It did find that the risk of midtrimester loss for a nulliparous woman who had had two or more induced abortions was about three times that for a nulliparous woman with no previous abortions, or about 76 cases per 100,000 women compared with 24 per 100,000 (565). After 1973 laminaria were substituted for instrumental dilation in most procedures. A comparison of midtrimester miscarriage rates in women undergoing abortions before and after 1973 found a 50 percent lower rate in the later group (565).

Much of the research on long-term complications of legal abortion is plagued by methodological problems, for example, inadequate abortion histories and failure to control for all factors that could influence both pregnancy outcome and abortion history (175). Thus few conclusions can be drawn from the research so far (33, 80, 134, 195, 483, 537). Additional research is necessary to identify more precisely the complications, if any, associated with different techniques used in legal abortion and which women might be particularly at risk.

Long-term complications of illegal abortion have not been studied as extensively as those of legal abortion, but, to the extent that the providers of illegal abortion are unskilled, the methods crude, and conditions unclean, any hazards are clearly much greater than for legal abortion. For example, infections can lead to subsequent blockage of the fallopian tubes, causing infertility (231).

Most of the studies of illegal abortion and pregnancy outcome have found an adverse effect on subsequent pregnancies. One Greek study found subfecundity over three times more common in women who had had abortions than in those who had not (591). Another found that women who had had ectopic pregnancies were twice as likely to have had previous abortions as similar women who had normal pregnancies (579), while a third study found that premature births and stillbirths occurred more often to women who had had abortions than to those who had not (580, 581). By contrast, a study in Taiwan, after accounting for other factors influencing pregnancy outcome, found that a history of abortion was not associated with spontaneous abortion (561). Relying on anecdotal evidence, several researchers cite illegal abortion as one possible cause of secondary infertility in parts of Africa (9, 20, 25, 27, 178, 342, 358). Other long-term complications which may stem from illegal abortion include chronic pelvic infection, higher risk of ectopic pregnancy, and parametritis (24, 54).

For any woman, illegal abortion can be hazardous and painful, carrying immediate risks to life and health and impairment of later fertility as well as other long-term complications. Undoubtedly many women are not aware of these dangers, while others face the dangers knowingly, determined or desperate to avoid an unwanted birth. For an individual, the risks and costs are high. For the community also, illegal abortion incurs both human and financial costs by placing a heavy burden on limited health care resources.

Risks of Abortion Versus Risks of Contraception

The risk of dying from an illegal abortion far exceeds the risk of dying from any method of contraception. Oral contraceptives and IUDs are from 10 to several hundred times safer than abortion. Sterilization is also many times safer than illegal abortion although comparisons are more difficult to make.

Roger Rochat estimates that, in the 65 countries with affiliates of the International Planned Parenthood Federation, roughly 84,000 women die annually from illegal abortion, while among 3 million women served by IPPF programs, 52-89 may die from complications of contraceptive use (396).

Statistics on mortality due to contraceptives in developing countries are as difficult to gather as statistics on mortality from

Table 4. Methods of Induced Abortion and Subsequent Hospitalization, Santiago, Chile, 1962

	Number of Induced Abortions		
Method	No. of Abortions	No. Admitted to Hospital	Percentage Hospitalized
Curettage	504	96	19.0
Drugs	119	41	34.5
Catheter	581	243	41.8
Douches and other	55	20	36.4
Not stated	63	17	27.0

Source: Armijo & Monreal (35)

illegal abortion. Therefore comparisons of the risks associated with various methods of preventing unwanted births are derived from models based on various separate studies of fertility and mortality, many conducted in developed countries. Christopher Tietze and colleagues have developed such a model for developed countries (485, 586), and Malcolm Potts, J. Joseph Speidel, and Elton Kessel have adapted the model to apply to developing countries (368). Potts and colleagues have estimated the number of deaths per 100,000 women using various fertility control methods in each 5-year age group both in moderately developed countries, such as Taiwan and Korea, and in the least developed countries, such as Bangladesh, Ethiopia, India, and Indonesia. This model can be used to compare the risks of illegal abortion and contraception.

If the abortion mortality ratio in moderately developed countries is 50 deaths per 100,000 procedures (483) (see p. F-110), mortality associated with using illegal abortion to control fertility for a year ranges from 50 to 83 deaths per 100,000 women. The risk varies with the woman's age, which influences both the number of abortions needed to prevent all births during each year and her ability to recover from complications of abortion. Illegal abortion would be least risky for women age 15-19, who are estimated to require an average of one abortion per year to prevent all births. Women age 30-34 would face the highest annual risk because their fertility remains high, requiring on the average more than one abortion per year to avoid all births, while their older age increases the risks of the abortion procedure. After age 35 declining fertility lowers the annual risk of abortion to a rate of 63 deaths per year per 100,000 women age 40-44. If in the least developed countries the mortality ratio is 100 deaths per 100,000 procedures (483), mortality rates rise from 100 deaths per 100,000 women age 15-19 to 168 deaths per 100,000 women age 30-34 and then decline to 123 per 100,000 women age 40-44.

The risks of contraceptive methods are a fraction of these figures. For the moderately developed countries, oral contraceptives (OCs) are 5 to 125 times safer than illegal abortion. For the least developed countries the difference is even more dramatic: OCs are 10 to 250 times safer. IUDs are 20 to 40 times safer than illegal abortion in moderately developed countries and 5 to 125 times safer in the least developed countries. The relative safety of these contraceptive methods is greatest for the youngest women (age 15-19) and least for the oldest women (age 40-44) because the risks associated with OCs and IUDs are estimated to increase with age, although much more sharply for OCs than for IUDs (368).

Overburdened with abortion complication cases, many hospitals in developing countries have insufficient resources to provide adequate care to all women, including those having term deliveries. In this maternity ward in Jamaica, each bed holds two mothers and their babies. The women must leave the hospital after 24 hours. (Pickerell/World Bank)

Comparisons with the risk of sterilization are more difficult because all the risks occur at the time of the procedure, but the contraceptive effects continue through all subsequent years of potential fertility. Even in the least developed countries, undergoing a sterilization procedure would be 1.5 to 3 times safer than using illegal abortion to control fertility for one year. When the risk of a sterilization procedure is averaged over the number of years of contraceptive protection it provides, sterilization is up to 75 times as safe as illegal abortion, depending chiefly on the age of the woman when she is sterilized.

COSTS

Complications of illegal abortion burden not only individual women but also medical institutions and society as a whole. Treating abortion complications consumes substantial quantities of scarce resources — hospital beds, blood supplies, and the time of trained medical personnel. In some developing countries the cost of treating abortion complications accounts for up to 50 percent of the budgets of maternity hospitals (222, 375).

While many have acknowledged that illegal abortion is a major public health problem, few have attempted to estimate the full cost. Since it is often impossible to distinguish between illegally induced abortions and spontaneous abortions, the cost of treating illegal abortions cannot be exactly determined. It is clear, however, that the bulk of abortions with complications are illegally induced and that complicated cases are more costly than uncomplicated cases. The following measurements have been used to gauge the costs of abortion:

- abortion complication cases as a percentage of all hospital admissions
- abortion complication cases as a percentage of all obstetrical and gynecological admissions
- abortion complication cases per 1,000 deliveries in hospital
- amount of blood used to treat abortion complications
- number of days of hospitalization per patient admitted with abortion complications.

Hospital Admissions and Use of Hospital Resources

Abortion complication cases comprise a significant proportion of all hospital admissions. In studies from hospitals in developing countries, the percentage of admissions attributed to abortion complications is as high as 45 (see Table 5). Health services specifically for women report the highest percentages of course; maternity and women's hospitals are overburdened with abortion cases (see Table 5). In the Maternal and Child Institute in Bogotá, Colombia, for example, almost one of every five patients is admitted for abortion complications (187, 572). Some maternity hospitals in Iran and Mexico have treated one abortion case for every seven or eight patients (217, 347). In Rangoon, Burma, 40-45 percent of admissions at the Central Women's Hospital are abortion-related (313).

Obstetrical and gynecological services report even higher rates (see Table 6). In some Nigerian and Ethiopian hospitals, abor-

Table 5. Admissions for Complications of Illegal and Spontaneous Abortion as a Proportion of All Hospital Admissions, Selected Studies, 1963-1979

Region & Country	Ref. No.	Period & Place of Study	No. of Admissions for Abortion Complications	% of All Hospital Admissions Attributed to Abortion Complications
AFRICA				
Kenya	286	Annual average, Kenyatta National Hospital, Nairobi	5,050[a]	5
Nigeria	242	1970-1972, Lagos Island Maternity Hospital	6,110	7.9
Tanzania	93	Annual average, Bugando Hospital, Mwanza	1,250	.5
ASIA				
Burma	313	Annual average, Central Women's Hospital, Rangoon	7,765[a]	40-45
India	377	Jan. 1969-June 1969, Vani Vilas Hospital, Bowring and Lady Curzon Hospital, K.C. General Hospital, Malleswaram, Bangalore City	981	9.32
MIDDLE EAST				
Iran	217	1960-1967, Farah Maternity Hospital, Teheran	37,592	14
WESTERN HEMISPHERE				
Brazil	398	1968, large hospital in Belo Horizonte	4,000[b]	40
Chile	363	1958-1960, National Health Service hospitals	NA	8.1
Colombia	187	Annual average, Maternal and Child Institute, Bogotá	6,000	20
	282	1965, Maternal and Child Institute	5,738	19.3
	572	1970-78, Maternal and Child Institute	54,705	18
El Salvador	308	1969-1973, hospitals and health centers	42,353[c,d]	4.8
Mexico	347	5 years, 3 large Mexican Social Security Institute Maternity hospitals in Federal District	61,964	14
	390	Annual average, Hospital Gineco Obstetricia No. 2, Mexican Social Security Institute	2,020[a]	15[a]

[a] Estimate; includes admissions for therapeutic abortions performed in hospital
[b] Only admissions for abortions induced outside the hospital
[c] Discharges
[d] Excludes legally induced abortions

Table 6. Treatment of Spontaneous and Induced Abortions as Proportion of Gynecological Services: Operations, Admissions, or Beds, Selected Studies, 1970-1977

Region & Country or Area	Ref. No.	Period & Place of Study	Percentage of Services Committed to Abortion Complication Cases
AFRICA			
Ethiopia	16	1965, Adeoyo Hospital, Ibadan	43% of 1,055 admissions
		1966	48% of 1,288 admissions
		1967	57% of 1,317 admissions
		1967-68, University Teaching Hospital, Addis Ababa	31% of 666 admissions
Ghana	28	Korle Bu Hospital, Accra	39.47% of 76 beds
		1967	89.8% of 3,191 minor operations
		1968	70.1% of 4,542 minor operations
		1969	75.1% of 3,411 minor operations
Nigeria	16	1964, Lagos University Teaching Hospital	18% of 951 admissions
		1965	20% of 967 admissions
		1966	15% of 804 admissions
		1967	14% of 953 admissions
	342	July 1974-Feb. 1975, University of Benin Teaching Hospital, Benin City	25% of 555 admissions
MIDDLE EAST			
Jerusalem	310	1970, 2 hospitals, West Bank	50% of 702 operations
WESTERN HEMISPHERE			
Jamaica	436	All hospitals	20% of beds

Table 7. Average Amount of Hospital Blood Supply Used Annually to Treat Abortion Complications, Selected Studies, 1963-1973

Region & Country or Area	Ref. No.	Period & Place of Study	Average No. of Abortion Cases	Volume of Blood Used for Abortion Cases (liters)	Percentage of Hospital Blood Supply
AFRICA					
Ghana	28	1968-1969, Korle Bu Hospital, Accra	NA	1,023.1	41.3
	25	1970-1972, Effia-Nkwanta Hospital (semi-rural area)	848[a]	42.7	8.9[b]
		1970-1972, Koforidua Hospital	336[a]	6.6	2.7[b]
Mauritius	25	1970-1972, 2 urban and 7 rural hospitals	2,059[a]	NA	~18[b]
Uganda	25	1970-1972, Mulago Hospital, Kampala	1,709[a]	170.1	3.4[b]
MIDDLE EAST					
Jerusalem	310	1970, 2 major Jordanian hospitals	351	30	
		hospital in Nablus, West Bank	695	.5-1	
WESTERN HEMISPHERE					
Chile	363	1962, emergency departments in all hospitals, Santiago	NA	NA	26.7
Colombia	512	1966-1968, University Hospital of Caldas	1,229	NA	4.6

NA = not available

[a] Includes some therapeutic induced abortions

[b] Percentage of blood used in period rather than percentage of supply

tion cases account for 25 to 57 percent of all gynecological admissions (16). In Jamaican hospitals septic abortion cases alone occupy 20 percent of the beds in gynecological wards (436).

Abortion complications can also be measured in relation to the number of deliveries in a hospital. Even where birthrates are high, the ratio of hospitalized abortion complications to hospital deliveries is substantial. Hospitals in Lebanon, Kuwait, and Morocco, for example, treat 100-200 abortion cases for every 1,000 deliveries (54, 162, 188, 246). The ratios in Chile, Colombia, Mexico, and several African countries are even higher (25, 513, 547, 572). In 1972, Kenyatta National Hospital, Nairobi, Kenya, admitted 437 abortion cases for every 1,000 deliveries (25). While these figures provide a rough indication of the proportion of hospital costs that can be attributed to abortion complications, they do not provide a full picture because abortion complications may require more care and more expensive treatment than normal delivery or other obstetrical and gynecological care.

Blood Supply

Since hemorrhage is a frequent and major complication of illegal abortion, treatment of complicated abortions often uses large quantities of blood. In many developing countries, blood is costly and in short supply (112). In African and Latin American hospitals anywhere from 3 to 41 percent of all blood used goes to illegal abortion cases (see Table 7). In the emergency services of all Santiago, Chile, hospitals in 1961, for example, women with abortion complications, the largest group of patients seeking emergency care, received 18 percent of all transfusions and used 27 percent of emergency blood reserves (363).

Blood transfusions account for much of the cost of treating abortion complications. A World Health Organization (WHO) study in Turkey and Venezuela attributed 49 percent of the expense of treating illegal abortion cases to transfusions. Transfusions were the single most expensive aspect of treatment — more costly than surgery, anesthesia, laboratory studies, medication, intravenous fluids, or other procedures. In an Ankara, Turkey, hospital the average cost of blood alone for an illegal abortion case was 2.5 times the cost of a legal therapeutic abortion (537).

Hospital Stay

Hospital stays for abortion complications average two to four days (see Table 8) but vary greatly, depending upon the extent of complications. Women with incomplete abortions (often spontaneous) without other complications may stay two days or less (234, 275, 392), but where complications are more frequent and severe, mean hospitalization may be as long as seven days, as reported by one Nigerian hospital. The Nigerian patients studied, all women under age 20, had high rates of tetanus and other serious complications (15). Sepsis, the most frequent major complication of illegally induced abortion, often causes prolonged hospital stays. In a hospital in San Salvador, El Salvador, for example, the average hospital stay for 525 patients treated for septic abortions between 1974 and 1978 was 6.4 days (206).

Extended hospitalization of course adds to costs. In a Santiago, Chile, hospital, for example, the cost of beds for all abortion patients during six months in 1974 was approximately $23,690 (US). According to an estimate by Rafael Viada and colleagues, if the 80 percent of the patients whose abortions were presumed to have been illegally induced had undergone abortions performed by physicians, the total hospitalization required

Table 8. Mean Hospital Stay for Abortion Complication Cases, Selected Studies, 1970-1980

Region & Country	Ref. No.	Period & Place of Study	No. and Type of Abortion Cases	Mean Hospital Stay or Percentage Distribution
AFRICA				
Ghana	99	Feb. 1972-May 1973, University of Ghana Medical School, Accra	104 septic 1,021 nonseptic	3.9 days 1.9 days
Nigeria	15	1963-1967, Lagos University Teaching Hospital, Benin City	134 spontaneous and induced for women less than age 20	7.1 days
	342	July 1974-Feb. 1975, University of Benin Teaching Hospital	59 induced	11.9% 1-2 days 33.9% 3-6 days 47.4% 7-21 days 6.8% approximately 42 days
	242	1972, Lagos Island Maternity Hospital	1,990 spontaneous and induced	90.4% 1-5 days 6.6% 6-10 days 3.0% 11-30 days
Uganda	266	Nov. 1973-Nov. 1974, Mulago Hospital, Kampala	1,377 spontaneous and induced	92.7% 1-5 days 5.5% 6-10 days 1.5% 11-35 days 0.3% 36 or more days
ASIA				
Bangladesh	52	1978, Chittagong Medical College Hospital	266 spontaneous and induced	3.9 days
	214	Nov. 1978-Aug. 1979, Sir Salimullah Medical College Hospital, Dacca	607 spontaneous and induced	2.2 days
India	360	1971-1973, Government Erskine Hospital, Madurai	393 septic	72% 1-7 days 20% 2 weeks 8% 3-5 weeks
	223	Jan. 1977-Dec. 1978, Government Erskine Hospital, Madurai	360 septic, induced	55% less than 7 days 30.5% 7-15 days 14.5% more than 15 days
	351	1973-1977, L.N.J.P. Hospital	190 septic	9.3 days
Indonesia	47	1972-1974 (about 28 months), University of Indonesia at Jakarta	158 septic 270 nonseptic	2.5 days 3.0 days
Thailand	568, 569	1968-1976, Siriraj Hospital, Bangkok	3,182 induced	79.4% less than 6 days 16.7% 6-10 days 3% more than 10 days
	381	May 1969-Feb. 1970, Ramathibodi Hospital, Bangkok	144 spontaneous, induced, and therapeutic	4 days
MIDDLE EAST				
Egypt	47	June 1971-June 1973, Kasr-el-Aini Hospital, Cairo	16 septic 511 nonseptic	2.8 days 1.5 days
	222	1969, Kasr-el-Aini Hospital, Cairo	1,620 spontaneous and induced	6.4 days
Jordan	310	1970, 2 general hospitals in Jerusalem, West Bank	351 spontaneous and induced	36-48 hours
		1970, Nablus Hospital, West Bank	695 spontaneous and induced	36-48 hours
Sudan	410	Spring 1974-Dec. 1974 (about 8 months), Omdurman Maternity Hospital, Khartoum North Obstetrics Section and Khartoum General Obstetrics Section	1,117 spontaneous and induced	1.3-2.6 nights
WESTERN HEMISPHERE				
Chile	513	May 1974-Oct. 1974, Felix Bulnes Hospital, Santiago	602 incomplete abortions*	2.5 nights
	69	1967, San Francisco de Borja Hospital	49 septic 51 nonseptic	4-8 days 2-3 days
Colombia	392	1974-1975, 10 hospitals	2,423 spontaneous and induced	1.5-5.8 days
Jamaica	203	1971, Victoria Jubilee Hospital, Kingston	259 septic 1,500 incomplete	almost 6 days almost 2 days
Venezuela	537	NA	12 induced 329 probably induced 139 possibly induced 412 spontaneous	4.5 days 3.5 days 2.8 days 2.5 days

*3% hydatidiform mole (1 case) and threatened abortion (17 cases)

Table 9. Price of Illegal Abortion to Individual, Selected Developing Countries

Region & Country	Ref. No.	Period	Type of Abortion or Abortion Practitioner	Price		Per Capita National Disposable Income[a]
				Local Currency	$ (US)	
AFRICA						
Ghana	24	1970	Instrumentation	6-40 new cedis	$2.00-14.50[b]	$396 (1974)
			"Twig" dilators	3 new cedis	$1.00	
Nigeria	367	NA	Lay abortionist	"a few naira"		NA
Karno		NA	Physician	15 naira	$46.50	
Lagos		NA	Physician	50-80 naira	$155-248	
Tanzania						
Dar es Salaam	434	1979	Physician in private hospital		$150-200	$168 (1976)
ASIA						
Bangladesh	403	1979	Traditional midwife	60 taka	$4.00	NA
			Nurse or midwife	111 taka	$7.00	
			Registered physician	249 taka	$16.50	
Hong Kong	1	1977	Private physician		$200.00	NA
Indonesia	416	NA	Traditional midwife	0	$0	$66 (1970)
			Private physician or trained midwife	10,000-75,000 rupiahs	$25-175	
Korea						
Seoul	197	1977-1978	1st trimester	15,000 won	$30	$652 (1976)
			2nd trimester	50,000 won	$100	
Pakistan						
Lahore	405	NA	NA	0-399 rupees	$0-100[b]	
Philippines	155	1979	Catheter insertion	20-700 pesos (average 185)	$2.50-94.00 ($24.50)	$369 (1976)
			Massage	2-250 pesos (average 52)	$.50-33.50 ($7.00)	
			D&C	600-2,500 pesos (average 850)	$80.50-336.00 ($114.50)	
Cavite Province	146	1976	Traditional midwife	0-80 pesos[c]	$0-10.50[b]	NA
			Licensed midwife providing tablet	0-1 pesos	$0-.50[b]	
			Nurse providing tablet	0-4 pesos[c]	$0-.50[b]	
			Physician providing D&C	100-300 pesos[c]	$13.50-40.50[b]	
Taiwan	101	NA	Physician		$10-20	NA
Thailand	318	1978	NA		$0-300	$351 (1976)
	111	NA	Physician providing D&C	1,000-1,600 baht	$50-80	
			Nurse, midwife, injection seller, various laymen providing injection	800 baht	$40	
			"Cruder methods"	300-500 baht	$15-25	
MIDDLE EAST						
Jordan	116	NA	NA	25-30 (English) pounds	$56.00-67.00	NA
Lebanon	54	NA	Physician	100-600 pounds	$29.50-176.00	NA
Turkey	226	NA	General practitioner	3,000 liras	$50	NA
			Obstetrician-gynecologist	10,000 liras	$150	
WESTERN HEMISPHERE						
Chile	208	1980	Physician		$100	$659 (1975)
Ecuador	432	NA	Nurse-midwife	Minimum 200 sucres	$10	$623 (1976)
			Physician	Maximum 800 sucres	$40	
Jamaica	202	1971	NA		$0-30+	$1,307 (1976)

NA = not available

[a] Data from UN Statistical Yearbook 1977 (596)

[b] Based on exchange rates on June 10, 1980

[c] Dependent on type of abortion

would have been only 200 nights in contrast to the 1,517 nights actually spent and would have cost only $3,123 (US), a savings of 87 percent (513).

In addition to the longer use of a bed, complicated cases require more laboratory and pharmaceutical resources and more attention from health care personnel. Using records from a hospital in the Dominican Republic, Antonia Ramírez and Ezequiel García calculated that treating a complicated abortion cost $176 (US) — more than twice as much as treating an incomplete but otherwise uncomplicated abortion and more than 12 times as much as a normal birth (375). In Kasr-el-Aini Hospital in Egypt the daily cost of treating a complicated abortion case in 1968 was five times the cost of treating an uncomplicated abortion case (222).

Many developing countries lack the resources to pay these costs and at the same time to meet basic needs in maternal and neonatal health. Under the combined impact of high birthrates and high rates of hospital admission for abortion complications, hospitals are hard pressed to provide quality care. When the volume of abortion-related cases requiring special attention is heavy, fewer beds, less staff time, and fewer supplies are available for women needing other obstetrical and gynecological care, including family planning services.

One result is that both the women giving birth and the women with abortion complications may be discharged too soon. Commenting on the shortage of hospital beds in Latin America, Benjamin Viel noted that women giving birth were forced to leave the hospital shortly after delivery and to resume household chores before they were fully recuperated, possibly contributing to maternal and neonatal morbidity and mortality and to subsequent gynecological problems (514). In some hospitals in Africa and the Middle East, hospital policy requires that abortion patients be discharged 24 to 48 hours after admission (28, 222, 266, 310). Ironically, the current high volume of abortion complications and deliveries makes it difficult for hospitals to allocate the space and time needed for family planning services that could in the long run ease the burden of illegal abortion complications (see "Abortion and Contraception," p. F-126).

The Price of Abortions

The cost of illegal abortion falls on individual women as well as on hospitals and public facilities, and paying for an illegal abortion can create enormous personal hardship. The price of an illegal abortion varies widely, from no fee to $300 (US) (seeTable 9). Traditional birth attendants and other nonmedical abortionists often charge fairly low fees and at times accept goods in exchange for the abortion (146, 416, 367, 448). Medical professionals, on the other hand, may exact high fees. In Dar es Salaam, Tanzania, a country where the per capita national disposable income is $168 per year (596), physicians charge between $150 and $200 for dilatation and curettage (D&C) (434). Physicians in Chile, Hong Kong, Indonesia, Jordan, Thailand, and Turkey charge between $100 and $300 (1, 116, 208, 226, 318, 416). The safest and most effective abortions are the most costly; for poor women, only the more dangerous methods and less trained practitioners are affordable (515).

The price of an illegal abortion is not limited to the provider's fee. Added is the cost of any drugs or preparations used to alleviate subsequent complications and the price of transportation to a hospital. In addition, there are the indirect costs of the abortion—the loss of pay from missed work days, the loss of a woman's services to her family for the period of her hospitalization, and the permanent loss if she dies. Thus, the economic and social burden of abortion complications is substantial even without the cost of hospitals and medical services.

CLINICAL MANAGEMENT

The most frequent major complications of illegal abortion are excessive blood loss, pelvic infection, and shock (536). Trauma to the reproductive organs is also common. Since many illegal abortions, particularly in South Asia, are induced with twigs or sticks (396, 403), major uterine and intestinal perforations are often reported (25, 50) (see photo, p. F-122). Unlike uterine perforations resulting from abortions performed by trained medical personnel (149, 320), tears caused by twigs or other instruments often cannot be managed conservatively and may require immediate laparotomy (279) and sometimes hysterectomy (482).

The incidence of hemorrhage requiring transfusion among women hospitalized for abortion complications varies widely, ranging from only 2 percent reported in hospitals in Thailand and Ghana (25, 234) to 45 percent reported in a Bangladesh hospital (214). Hemorrhage is more frequent after illegally induced abortions than after spontaneous abortions, and, in fact, is often used as a criterion for determining whether an abortion is illegally induced (44, 214). The role of hemorrhage in mortality is difficult to assess. Many investigators do not specify the cause of death in abortion cases; when they do, infection, septic shock, and tetanus are more frequently mentioned. Procedures for transfusion are well established, but the lack of sufficient blood supplies remains a major difficulty. Other complications — particularly septic abortion, septic shock, and renal failure — pose more complex problems of management.

Septic Abortion

Septic, or infected, abortion is one of the most commonly treated conditions in obstetrical and gynecological services in developing countries. The vast majority of cases of infection stem from induced abortion, although sepsis can also result from premature rupture of the fetal membranes (60, 418), from spontaneous abortions, particularly in areas where medical treatment is inaccessible (16), and from chronic renal disease. Nonsterile instruments used by unskilled abortion providers contribute to the incidence of infection in illegal abortion (10, 187, 266, 483), thereby increasing the risk of death. A recent US study reports that the risk of dying from sepsis after illegal abortion is over 50 times greater than after legal abortion (176).

Although clinical criteria vary, abortion is usually considered septic when there is:

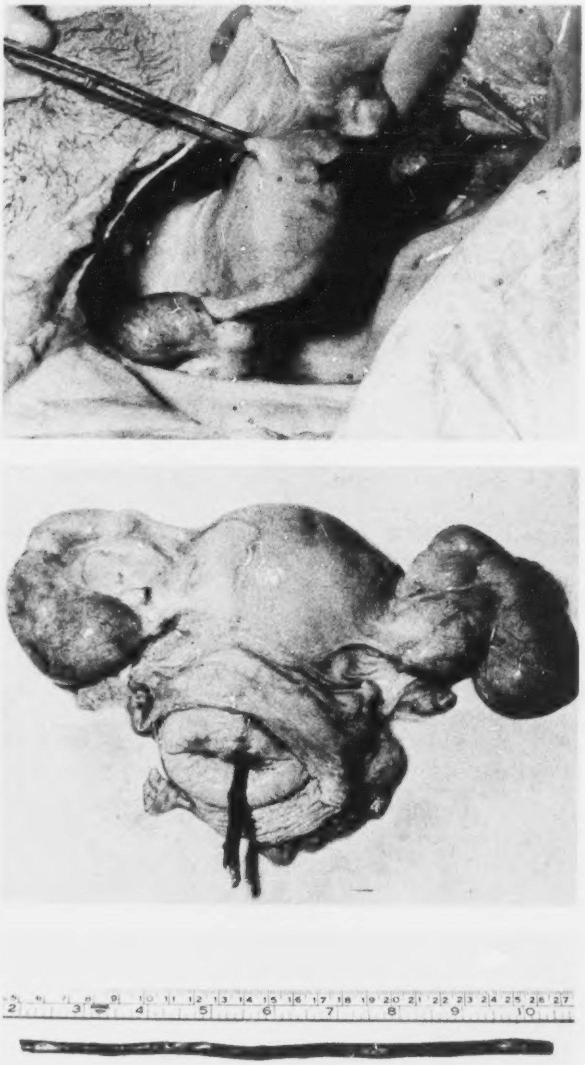
- a fever of at least 38°C for 24 hours or more
- foul smelling or purulent vaginal or cervical discharge, and
- other evidence of pelvic infection such as lower abdominal pain and rebound (58, 87, 137, 189, 303, 329, 342, 381, 418, 429, 551).

The amount of bleeding does not indicate sepsis; uterine bleeding may be slight or heavy. In cases where uterine perforation has occurred, there may be internal hemorrhage (87, 551). The patient's pulse is full, rapid, and bounding (551). During pelvic examination, manipulation of the cervix usually produces severe pain, while in a woman with spontaneous abortion the same procedure causes little discomfort (87). Evidence of interference — tenaculum marks on the cervix or vaginal lacerations, for example — may be observed (87, 551).

The severity of septic abortion depends in part on the extent of the infection. The prognosis is most favorable when infection is limited to the uterus and its contents and least favorable when infection has spread beyond pelvic structures. The most serious complication of septic abortion is septic shock, acute circulatory failure associated with infection (524), which accounts for the majority of abortion-related deaths. Thus, the physician's major concern in treating septic abortion is to prevent septic shock (253).

Management of septic abortion calls for:

- large doses of antibiotics to control infection
- monitoring and correcting blood volume, and
- early removal of the source of infection (20, 60, 71, 87, 137, 253, 402, 427, 430, 525).



A twig inserted into the cervix to induce abortion may perforate the uterus and also the intestines, necessitating laparotomy and sometimes hysterectomy, as in this case in India. (Courtesy of Rohit Bhatt)

Where facilities are available, laboratory tests for diagnostic purposes are recommended, including smears and cultures from the uterus, cervix, and blood to identify the dominant microorganisms and to check for sensitivity of the microorganisms to antibiotics; complete blood counts; urinalysis; evaluation of serum electrolytes; and coagulation studies. An upright X-ray of the abdomen and pelvis is advisable (87, 253, 426) to check for the presence of catheters or other foreign bodies within the uterus or peritoneal cavity and to help identify uterine perforation or peritonitis.

Use of Antibiotics

The practitioner's initial choice of antibiotic is based on a knowledge of the pathogens normally associated with septic abortion, usually a mixture of two or three microorganisms (406). Generally these microorganisms are the gram-negative bacilli (that is, bacilli not retaining a stain in the Gram method of staining). Particularly common are *Escherichia coli* (60, 78, 109, 128, 137, 176, 218, 430, 525) and *Bacteroides fragilis* (252, 253, 406). Gram-positive cocci, particularly enterococcus and beta hemolytic streptococcus are also frequent (430, 572, 577). Since some of these pathogens are aerobic (oxygen-requiring) and some anaerobic (requiring no oxygen) organisms, initial antibiotic selection must include broad-spectrum drugs which cover both types of bacteria. If culture and sensitivity tests can be conducted to identify the particular bacteria causing the infection, more specific drugs can then be selected.

When the gram-stained smear detects gram-positive drumsticks, infection by *Clostridium perfringens (Clostridium welchii)* or *Clostridium tetani*, bacteria which cause gas gangrene and tetanus, respectively, is a possibility. While some practitioners advocate immediate hysterectomy in such cases (60, 71, 551), particularly when tetanus is suspected, others recommend deferring radical surgery unless symptoms such as parametrial tenderness, abdominal or intrauterine gas formation as seen by X-ray (see photo, p. F-123), or evidence of red blood cell lysis (separation of hemoglobin from the red blood cells) or coagulation occur (253, 430). Gas formation can also be detected by physical examination. During a pelvic exam, the attendant will be able to palpate gas while pressing against the pelvic organs with the abdominal and vaginal examining fingers.

Initial antibiotic therapy should always be parenteral and intensive. High doses should be continued unless the woman's clinical response or culture and sensitivity tests provide an indication for changing the initial antibiotic regimen.

Penicillin is the antibiotic most frequently used for septic abortion, with dosages ranging from 20 to 30 million units given intravenously daily (189, 551). Traditionally, penicillin has been administered alone (78, 329, 411, 418, 461) or in combination with streptomycin (118, 169, 218, 220, 260, 261, 381, 450, 480). Since the involvement of *B. fragilis* in septic abortion has been recognized, drugs specifically effective against this microorganism and other gram-negative anaerobes have been used. These drugs include chloramphenicol (86, 428, 430, 491, 525), clindamycin (243, 293, 428, 563), and the newer tetracyclines such as doxycycline (252, 253). Kanamycin and gentamycin also are useful for gram-negative organisms (253, 290, 406, 430). Recommendations for specific dosages of antibiotics may be available from package inserts and labeling or from pharmaceutical manufacturers and distributors in each country.

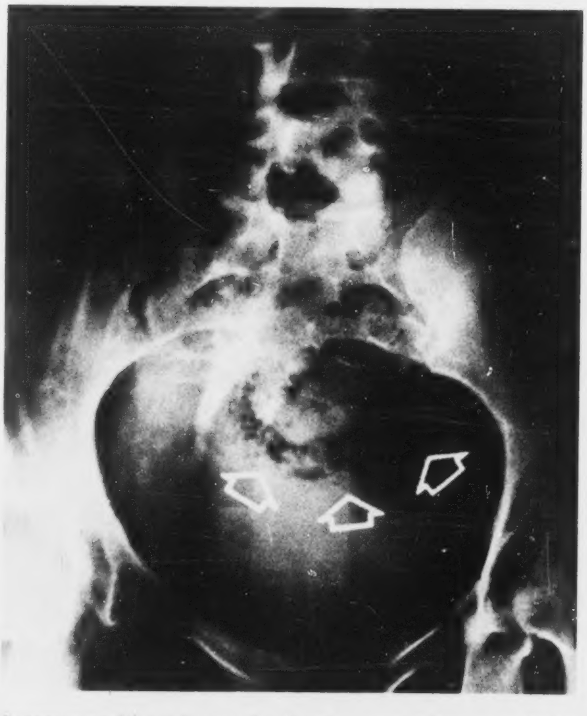
Thirty thousand units of tetanus antitoxin should also be given intramuscularly after skin testing if the woman has not already been immunized (87, 551).

Two randomized clinical trials conducted in the United States have compared the effectiveness of different antibiotic regimens in the management of women with septic abortions. Evaluating the patients' duration and persistence of fever after evacuation of the uterus, Donald R. Ostergard found no significant differences between a group of women treated with penicillin and chloramphenicol and a group treated with cephalothin and kanamycin (349). By contrast, Anthony W. Chow and colleagues found significant differences between treatment regimens of penicillin with chloramphenicol and of clindamycin alone. While hospital stay and duration of fever were similar in the two groups, women given penicillin with chloramphenicol had significantly fewer major complications than women given clindamycin (102).

Monitoring Blood Volume

To assure adequate blood circulation to all body organs and thus prevent circulatory shock and renal failure, monitoring of blood volume should be started as soon as a woman arrives for treatment; any fluid and electrolyte imbalance should be corrected. If blood is available, in cases of severe blood loss — 500 ml or more — blood transfusions should be carried out before any surgery is attempted (87). Both urine output and, if equipment is on hand, central venous pressure (CVP) should be monitored.

The results of fluid monitoring govern volume replacement therapy. If urine output, as measured by a Foley catheter, exceeds 30 ml per hour, blood circulation to the tissues is adequate (551). If urine output drops below 30 ml per hour, the attendant must consider whether or not to begin fluid therapy.



Intramyometrial gas in a septic abortion, caused by gas-producing microorganisms, often *Clostridia*. Some advocate immediate hysterectomy in such cases. (Courtesy of Theodore M. King)

CVP, an accurate measure of circulatory blood volume, provides a guide for fluid replacement. When CVP is low — zero to 5 cm of water — fluid replacement therapy is necessary to correct hypovolemia (decreased volume of circulating blood). When CVP is above the normal range of 6 to 12 cm of water, overhydration and subsequent pulmonary edema are possible, and intravenous fluids should be sharply restricted (87, 110, 189, 411).

When CVP is not available, several clinical signs can indicate a woman's fluid level. When there is too much circulating fluid, the jugular veins in the neck often are distended. In addition, the attendant may be able to hear moist rales (abnormal sounds indicating the presence of fluid) at the base of the lungs, signifying pulmonary edema and potential congestive heart failure. When there is too little circulating fluid, there is reduced urine output and increased specific gravity of the urine. A specific gravity of 1.020 or more indicates inadequate fluid volume (230). Tachycardia (rapid heart beat) and a thready pulse also will be present.

Monitoring fluid balance is essential to early detection of renal failure, one of the most serious complications of septic abortion. Renal failure usually stems from the effects of the infection, although it can also be caused by toxic compounds used to induce abortion, such as soap or household antiseptic solutions (189). Early detection and treatment of renal failure are essential to prevent death. Treatment should be aimed at maintaining fluid and electrolyte balance. Without dialysis, however, managing renal failure is very difficult. The following measures may be useful in treatment:

- limit fluid intake to insensible loss (the amount of fluid lost through respiration and perspiration) (189)
- monitor fluid intake and output and the patient's daily weight to manage water balance (560)
- initiate procedures to maintain low levels of potassium
- provide carbohydrates to retard elevation of nitrogen levels (560).

Evacuation of the Uterus

Surgery is the third major element of treatment for septic abortion. In the West surgical management of septic abortion has been a subject of controversy: whether the uterus should be evacuated as soon as antibiotic therapy is begun or only after the infection has been controlled. Delaying curettage increases the likelihood of septic shock and hemorrhage (176, 426, 456), but the surgical intervention itself may lead to transient septicemia ("blood poisoning") and hypotension (low blood pressure) immediately after surgery (253). Randomized clinical trials comparing the medical consequences of the two treatment approaches have not been reported, but over the last 30 years the philosophy of treatment has changed dramatically. Whereas immediate evacuation of the uterus once was discouraged, it now is favored. By the early 1970s most US and European clinicians had adopted an aggressive approach and now intervene surgically within 24 hours of a woman's hospital admission, irrespective of fever (68, 88, 253, 411, 418, 426, 463, 554).

This shift in practice is illustrated by changes in successive editions of *Williams Obstetrics,* a widely used US textbook (426). In 1941 the text advised:

> . . . if infection has supervened the less we disturb bodily defense mechanisms, the better our results. In the very exceptional case, however, the febrile reaction to infected abortion is so marked as to indicate that the inflammatory process is not being

> properly controlled by the tissues, and it may then become advisable to empty the uterus by the most conservative and atraumatic means. (458)

By 1966, the recommendations had changed significantly:

> In our experience, infection confined to the uterus is best treated by immediate evacuation of the uterus although as stated there is a more conservative school of thought. (132).

In developing countries, surgical practices vary widely among hospitals. In Colombia, for example, the university hospitals prefer immediate uterine evacuation, while some other hospitals delay curettage for 12 to 24 hours after admission (391). In other countries, current practices range from evacuation within 2 to 6 hours of admission, as in some hospitals in Brazil and Mexico (117, 301), to delays of 24-48 hours after initiation of antibiotic therapy, as in some hospitals in India, Ghana, Zambia, and Nigeria (22, 279, 357, 402), or until the infection is controlled, as in some hospitals in India, Burma, and Bangladesh (213, 218, 225, 313, 360, 529).

Delaying curettage may increase the risk of death from infection. In a recent US study of 36 women who died from septic abortion between 1975 and 1977, 66 percent were found to have retained products of conception. The death-to-case rate for women with incomplete abortion was over 50 times higher than for those whose uteri were adequately evacuated. Retained fetal tissue provides a focus for the development of local infection which then leads to generalized sepsis (176).

Delaying curettage leads to longer hospital stays and higher costs (426). In a clinical study at the University Hospital of St. Vincent de Paul in Colombia, 615 septic abortion cases were randomly divided into two groups; the first was treated by immediate curettage and antibiotics, and the second by curettage 24-48 hours after the start of antibiotic therapy. The mean hospital stay for the group of women with delayed curettage was 6.8 days compared with 4.9 days for the women with immediate curettage. With delayed curettage, the cost of treatment was 31 percent higher (220).

At a May 1980 seminar on the Diagnosis, Management, and Prevention of High Risk Pregnancy, jointly sponsored by the International Fertility Research Program and Tulane University Medical School, Hiram W.J. Batson summarized the essentials of treatment of septic abortion:

> The hazards of incomplete early abortion are hemorrhage, sepsis, renal failure and acute septic shock. The management of incomplete early abortion should be directed toward the control of bleeding and the prevention of infection by prompt evacuation of the uterus. A first trimester abortion should usually be considered incomplete until the uterus has been curetted.
>
> In septic abortion, especially with septic shock, medical management is vitally important, but the need for surgical intervention is frequent. Preoperative preparation by a medical regimen is mandatory, and it must be thorough. A medical and surgical approach should complement each other, but an unnecessary delay before surgery may be fatal. (551)

Septic Shock

If untreated, septic abortion can lead to septic shock, one of the gravest complications in obstetrics and gynecology. Extensive research, much of it with animals, has shown that septic shock is generally associated with the endotoxin of gram-negative bacilli. It is characterized by reduced blood circulation, inadequate tissue perfusion (blood circulation through the tissues and organs of the body) resulting in deficient oxygen supply to cells, and metabolic acidosis (shift in the pH status of the body toward excess acidity) (85, 265, 418). Septic shock may arise from other infectious processes, such as chorioamnionitis (infection of fetal membranes) and pyelonephritis (infection of the kidney), as well as from septic abortions.

Table 10. Mortality from Septic Shock, Selected Studies, 1965-1979

Country	Ref. No.	Cases of Septic Shock	Deaths	
			Number	%
DEVELOPING COUNTRIES				
Brazil	327	42	18	43
Chile	123	26	5	19.2
	510	28	6	21.4
Egypt	137	22	5	22
India	223	54	22*	41
	225	6	2	33.3
	218	9	6	66.6
	378	122	54	44
Nigeria	339	14	2	14.3
Venezuela	271	30	6	20
DEVELOPED COUNTRIES				
United States	89	39	4	11
	412	19	9	47.3
	128	50	11	22
	429	36	12	33
	122	27	6	22

*Died in hospital or discharged moribund

The incidence of septic shock varies widely among women with infected abortions and depends partly on how soon the woman obtains medical care after the abortion and partly on the virulence of the infecting organism. Before abortion was legalized in the United States, the percentage of septic abortion patients who developed shock ranged from 1.8 to 3.8 percent (128, 418, 461). The incidence in developing countries can be considerably higher. In a sample of 141 septic abortion patients at Tanta University Hospital, Egypt, in 1973, 15.6 percent developed shock (137). In 1,190 septic abortion cases seen at Government Erskine Hospital, Madurai, India, 10.25 percent developed septic shock (378).

With the onset of septic shock, the patient's prognosis depends on a number of variables, including the extent of tissue trauma (252), the experience of her physicians in treating this clinical syndrome (88), her general state of health (243, 418, 444), and the supplies and equipment available. In developing countries mortality among hospitalized cases of septic shock is high, sometimes close to 50 percent (see Table 10).

Despite extensive experience with women and years of research with animals, the pathophysiology of septic shock is not well understood nor is the optimal treatment established. Septic shock associated with gram-negative bacteria develops when endotoxins are released from the cell membrane of the microorganisms which have entered the host (380, 429). Septic shock may also be caused by some gram-positive organisms, however, notably *Clostridium perfringens (Clostridium welchii)*, which do not produce endotoxins (265). In general, the interruption of normal blood circulation in septic shock follows the same pattern regardless of the type of microorganism (290).

The main features of septic shock are (1) reduced circulating blood volume and (2) deficient tissue perfusion. Some researchers have suggested that these symptoms are caused by vasoconstriction (429), while others have contended that disseminated intravascular coagulation (widespread clotting in the capillaries) is the major reason for reduced blood flow (277). It is now apparent that both mechanisms are at work (243, 380). Reduced blood circulation leads to tissue damage from hypoxia (deficient oxygenation) and causes widespread capillary leakage, systemic acidosis, and death (243).

While the precise physiological process is not fully understood, physicians have recognized the clinical sequence of septic shock (243, 290, 563). During the first phase, "warm shock," the patient is alert and hypotensive; systolic blood pressure is 85-95 mm Hg. Her skin is warm and moist, and her face may be flushed. Her temperature is usually over 39°C and there is moderate tachycardia — 100-120 beats per minute. Cardiac output is normal or increased and peripheral vasodilation is present. The second stage, "cold shock," is associated with vasoconstriction, decreased cardiac output, acidosis, and reduced urine output. The patient's temperature is often subnormal, her skin is pale and clammy, and she gradually becomes less alert. Unless treatment is instituted, irreversible shock, characterized by coma, cardiac and respiratory distress, and anuria (no urine output), will ensue (109, 411).

Since the abortion attempt and start of infection may precede the onset of symptoms of shock by several days (122, 384, 418), the infection may be far advanced before the woman seeks treatment. Careful monitoring of the patient is mandatory. Manuel Comas and Denis Cavanagh have suggested that the following monitoring schedule be followed if the necessary equipment is available (110):

Clinical Measurement	Frequency
Pulse rate	every 15 minutes
Blood pressure and pulse pressure	every 15 minutes
Central venous pressure (or pulmonary artery wedge pressure)	every 30 to 60 minutes
Urinary output via Foley catheter	every hour
Blood volume	early in course

In addition, all of the laboratory tests recommended for the diagnosis of septic abortion should be conducted.

Treatment of Septic Shock

Aggressive treatment is required as soon as shock is diagnosed. Such treatment has two primary objectives: to control the infection and to normalize the patient's blood circulation. Both medical and surgical techniques are used. The major elements of medical management are:

- antibiotics
- fluid therapy
- steroids
- vasoactive drugs.

As in the treatment of septic abortion, controlling infection is crucial. Antibiotic therapy should be started immediately (see p. F-122). The administration of intravenous fluids is also essential. In septic shock a substantial portion of the total volume of blood no longer circulates through the body. Thus there is a reduction in the amount of blood returned to the heart (524). To correct this situation, enough fluid should be given to fill the vascular space and produce an adequate venous return to the heart, thereby enabling the heart to pump an adequate cardiac output and begin restoring normal circulation (182).

The amount of fluid required to restore adequate cardiac output and tissue perfusion can be determined by urinary output measured by a Foley catheter and central venous pressure (CVP) or pulmonary artery wedge pressure (see p. F-123). Peripheral cuff blood pressure measurements are unreliable in shock (290).

The type of fluid administered depends on the need of the particular patient and the availability of various types of fluid. In cases of hemorrhage, whole blood is required. When there has been no significant blood loss, saline solution, plasma, protein solution, 5 percent dextrose in water, Ringer's lactate solution, and other electrolyte-containing fluids have been used (86, 182, 243, 290, 444).

The use of drug therapy for septic shock, particularly steroids and vasoactive agents, has been a source of controversy. With steroids, there is now increasing agreement that they are useful and should be given (411), although their mode of action is still not clearly understood (19, 21, 71, 79, 86, 107, 137, 182, 243, 265, 271, 290, 378, 381, 425, 426, 444, 456, 491, 563). Steroid therapy performs three major functions:

- It improves blood circulation and tissue perfusion (21, 79, 86, 182, 290, 425, 443).
- It preserves cell and lysosomal membranes, thereby preventing cellular damage (21, 79, 182, 290).
- It extends the woman's life long enough to allow other forms of treatment, especially antibiotics, to act (21, 182).

Steroids are most effective when given in pharmacologic doses early in shock (182, 290). The most frequently recommended steroids are methylprednisolone (21, 79, 86, 182, 290, 426) and dexamethasone (21, 86, 265).

A randomized double-blind study in the US supports the use of steroids in septic shock. The study, which involved male pa-

PUESTO DE SALUD
SAN MIGUEL SIGUILA

Hospitals are inaccessible to most rural communities, and small health posts like this one are not equipped to treat complications of illegal abortion such as hemorrhage and septic shock. (PAHO) tients at a Veterans Administration Hospital, showed greatly reduced mortality with steroid treatment. Control patients were treated with saline solution, and 33 of the 86 patients died (38 percent). Patients in the study groups received either dexamethasone (DMP) or methylprednisolone (MPS) at the time shock was diagnosed. Only 9 of 86 patients died (10 percent). There was no significant difference in mortality between the DMP- and the MPS-treated groups (425).

Vasoactive drugs have been used extensively in the treatment of septic shock but are now used sparingly. Formerly both vasodilators and vasopressors were central features in treatment regimens. While some still advocate wide use of vasopressor agents (86, 123, 563), others believe these drugs should not be routinely prescribed (182, 243, 444). Currently, clinicians use these drugs only if volume replacement fails to increase tissue perfusion (79, 243, 298, 444).

Dopamine, a naturally occurring catecholamine, has been found to increase coronary, renal, cerebral, and mesenteric blood flow, raise cardiac output, and increase blood pressure (163, 243, 290, 444). A number of clinicians are now advocating its use in septic shock (79, 243, 290, 298, 444, 530).

The second major focus of treatment for septic shock is surgical — removing the source of infection. In the past, surgery was sometimes delayed until medical treatment controlled shock (137, 239, 271). More recent studies indicate that prognosis in septic shock — as in septic abortion in general — is improved if the uterus is evacuated as soon as possible (86, 123, 426, 430). If curettage and early antibiotic treatment do not improve the patient's condition within hours, hysterectomy is recommended (71, 78, 86, 123, 128, 277, 384, 411, 426, 456). Other frequently cited indications for hysterectomy include perforation of the uterus (86, 378, 381, 435, 551), pelvic or myometrial abscesses (60, 86, 426), a uterus larger than 16 weeks gestation (86, 128, 456), the presence of intrauterine *Clostridium perfringens* (60, 71, 86, 378, 384), and the presence of detergent or caustic material in the uterus (60, 86, 265, 551).

Women with septic shock are often the most seriously ill patients any obstetrician or gynecologist treats. Complex medical and surgical decisions as well as costly equipment and supplies are required to save lives. Even in the most advanced hospitals mortality is high. Prevention, then, is the only way to reduce mortality substantially. Providing adequate family planning counseling services and contraceptive supplies is one way that hospitals and medical practitioners can help to accomplish this goal.

ABORTION AND CONTRACEPTION

The relationship between the use of abortion and the use of contraception is complex. On one hand, both are used by women to prevent unwanted births. On the other hand, studies of national trends and of individuals suggest that use of abortion or contraception is influenced by the availability of various methods and by such personal characteristics as age and parity. In general, if contraceptives are made available, more women hospitalized for abortion complications will use contraception and use more effective methods of contraception than before their abortions. Many physicians and institutions, however, do not yet provide contraceptives to hospitalized women (206, 528), even though the major modern contraceptive methods — OCs, IUDs, and sterilization — appear to be effective and safe for use immediately after abortion.

National Trends

On a regional or national level the relationship between contraception and abortion varies in different areas. With the introduction of intensive family planning programs, abortion rates may rise, remain the same, or decline, depending on the relative availability of abortion and contraception and on previous fertility control patterns. In Korea and Taiwan family planning programs were introduced at a time when fertility was high and rates of both contraceptive use and abortion were relatively low. Thus, as the desire for smaller families increased, women turned to both abortion and contraception. In Taiwan, for example, with the development of a national family planning program, the percentage of married women age 22-39 who had ever practiced contraception rose from 28 in 1965 to 76 in 1976. At the same time, the percentage of women in national surveys reporting ever having had an induced abortion also rose, from 9 to 21 (469).

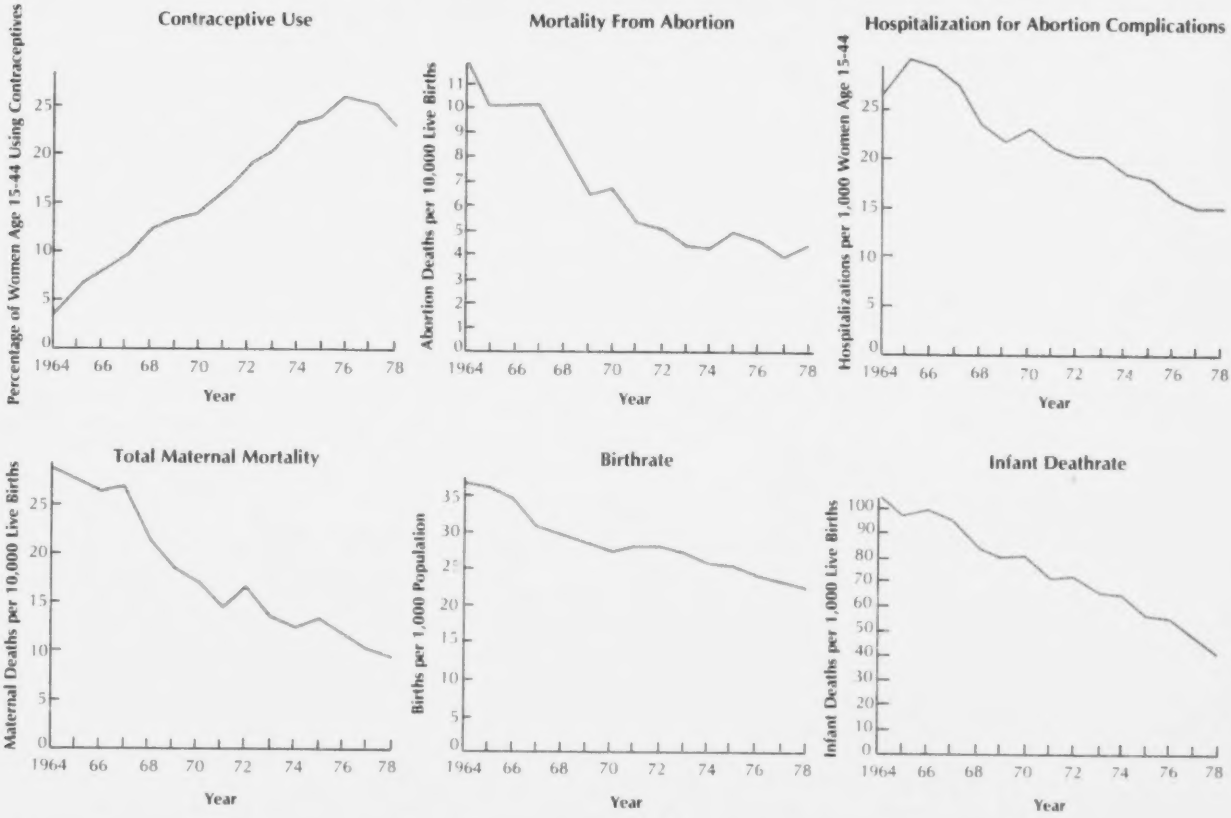
By contrast, in Chile an intensive family planning program began at a time when illegal abortion was apparently very common (see p. F-144) and contraceptive use very low. The program seems to have led to significant declines in hospitalization and mortality from abortion complications as well as to lower birthrates and improved maternal and child health. Thus, in Chile the increasing availability of contraceptives made it possible for women who already strongly desired to control their fertility to use contraception instead of abortion for that purpose. Between 1964 and 1978 the percentage of women age 15-44 using contraceptives increased sevenfold, from 3.2 to 23. During the same period the number of women admitted to Chilean hospitals for abortion complications declined from over 56,000 to 37,900. Maternal mortality from abortion decreased markedly, from 11.8 per 10,000 live births to 4.2 per 10,000 live births (345). While this decline in abortion complications may have occurred in part because more abortions are being performed by physicians, the size of the decrease, occurring simultaneously with declines in the birthrate, the neonatal and infant mortality rate, and the overall maternal mortality rate (see Figure 3), suggests that the number of women relying on contraception rather than abortion to control their fertility has increased and the number relying on abortion has decreased.

Studies of Individuals

On the individual level, women who are highly motivated to control their fertility will use both abortion and contraception (367). Women who have used contraception are more likely to have had abortions than women who have not used contraception, and vice versa. These relationships have been documented in surveys of women from Korea (198), Brazil (204), Israel (39), Taiwan (103), the Philippines (146), Singapore (471), Turkey (144), and the United States (543).

Having an abortion influences subsequent contraceptive use. More than 20 studies from different parts of the world of women hospitalized for abortion or abortion complications show that, in virtually every case, the number of women who use contraception increases dramatically after an abortion, sometimes as much as tenfold (see Table 11). The percentage using an effective method of contraception also increases, sometimes to an even greater degree. A dramatic example comes from one Asian center, monitored by the International

Figure 3. Rates of Contraceptive Use, Abortion Mortality and Hospitalizations, and Other Public Health Measures, Chile, 1964-1978



In Chile the rapid increase in contraceptive use since 1964 has been linked with a sharp decline in mortality from abortion and in hospitalizations for abortion complications. The decline in abortion mortality has contributed substantially to the drop in maternal mortality. Contraceptive use has lowered the birthrate markedly, and infant death rates also have fallen.

Source: Onetto (345)

Fertility Research Program (IFRP), in a country where abortion is legal. Only 7 percent of 1,159 women were using effective methods of contraception — sterilization, IUDs, or orals — before their abortions, whereas 72 percent chose one of these methods after abortion (289).

The woman most likely to accept contraceptives after abortion is married and has several children. Although the number of unmarried women included in abortion studies in developing countries is often very small, where meaningful comparison is possible, married women usually are more likely to accept birth control than unmarried women (5, 183, 194, 234, 288, 289). This may reflect women's differing perceptions of their immediate need for contraception as well as cultural attitudes about the acceptability of contraceptive use and sexual activity among unmarried women. An exception to the usual pattern is reported in a study of women discharged from 39 hospitals in nine Latin American countries. Among women under 20, the same percentage of married as unmarried women were using contraception when interviewed several weeks after treatment for abortion complications (206).

Maternal age, possibly in part because it is associated with marital status and parity, also affects contraceptive acceptance both before and after abortion. In both developed and developing countries women under age 20 accept contraceptives after abortion less frequently than women over age 20 (2, 5, 183, 206, 268, 270, 288, 289). Contraceptive acceptance among women over 20 varies. In some areas it increases with age (194, 408), while in others little difference is found (194, 289).

Education appears to be less important to postabortion contraceptive acceptance than other personal characteristics. Studies in India (65), four Asian hospital centers (289), Canada (172), and the US (433) have shown no correlation between a woman's education and use of contraception after abortion. By contrast, research in Asia, Sudan, and the Middle East has found a slight decrease in contraceptive acceptance at the hospital as education increased (65, 194, 408). Hamid Rushwan suggests that in Sudan educated women are more likely to obtain their contraceptives elsewhere (408, 409).

While most hospital studies do not separate spontaneous from induced abortion, occasionally researchers have made the distinction. Not surprisingly, women who have had induced abortions have higher rates of contraception both before and after abortion than women aborting spontaneously (44, 234, 289), many of whom may have wanted their pregnancies. A hospital study in Bangladesh, for example, found that 67.2 percent of women with induced abortions used contraceptives before their abortions and 96.2 percent accepted contraceptives at the time of hospital discharge. Among women with spontaneous abortions, 13.8 percent used contraceptives before the abortion and 32.4 percent afterwards (44).

Table 11. Contraceptive Use Before and After Hospitalization for Abortion or for Treatment of Abortion Complications, Selected Studies, 1972-1979

Region & Country	Ref. No.	No. of Women Interviewed Before/After Abortion	% Using Any Method		% Using Effective Method**	
			Before	After	Before	After
ASIA						
Countries NA						
Center A	289	279/272*	50	84	4	27
Center B		1,159/1,155	29	75	7	72
Center C		1,072/1,052	19	30	15	24
Center D		3,533/2,452	3	50	2	47
Bangladesh	44	479/465	NA	NA	28	52
	52	266/249	NA	NA	2	71
India	65	2,230/2,230	25	88	23	87
	281	570/554*	13	71	8	64
Indonesia	47	1,072/1,057	19	30	15	24
	408	874/865*	18	29	15	23
Korea	65	187/184	35	31	16	22
Singapore	65	3,152/3,152	66	93	60	89
Thailand	47	1,613/1,463	4	47	2	44
	65	301/301	5	44	4	43
	234	1,098/1,086	4	45	3	42
	568	521/509	19	82	13	69
MIDDLE EAST						
Egypt	47	740/724	28	56	15	54
Iran	45	100/58	36	55	11	40
Sudan	409	3,263/2,739	10	47	10	46
WESTERN HEMISPHERE						
Brazil	244	205/205*	10	NA	8	54
Canada	268	200/105	51	83	20	83
Chile	513	597/225	22	75	16	69
Colombia	392	2,915/2,284*	20	54	13	50
El Salvador	373	1,273/874	7	39	7	38
United States	270	303/301*	84	91	NA	NA
	288	5,883/3,518*	48	93	45	93

Note: Most studies do not differentiate among women hospitalized for complications of illegal abortion, for complications of spontaneous abortion, or for legal abortion. Inquiries about contraceptive use before hospitalization specified use in the month of conception in most countries, but some studies did not specify. Inquiries about contraceptive use at the time of follow-up were made 2-4 weeks after hospitalization in most studies, but in some studies followed hospitalization by as much as 3 or 6 months.

NA = not available

*Family planning counseling and/or services provided. For other studies, information not available.

**Effective methods include sterilization, oral contraceptives, IUD, condom, diaphragm, spermicides, and injectables. Some authors report all infrequently used methods, whether effective or ineffective, in a single category; percentage shown in table excludes this category and so slightly underreports actual use of effective methods.

Availability of Contraception

A woman's willingness to contracept after abortion and her choice of specific methods is influenced not only by her personal situation, but also by the information, supplies, and services available to her at the time of treatment for complications of abortion. Unless the hospital or clinic providing treatment offers contraceptive supplies and services, women may be unable to acquire contraceptives no matter how motivated they are to use them. In many areas, women hospitalized for abortion complications are treated and discharged as rapidly as possible (367), often within 24 hours or less (222, 266, 310), and their opportunity to acquire advice, information, and supplies is slight. Furthermore, the hospital may have no counseling or referral services at all or may prescribe contraceptives only at the woman's follow-up visit (206).

Where some form of family planning counseling is specifically provided before discharge, acceptance rates are high. For example, in three Sudanese hospitals, over 2,700 women hospitalized for abortion complications were asked about contraceptive use before abortion and 2-4 weeks afterwards; 10 percent had used contraception before compared with 47 percent afterwards (409). Better counseling, provision of a larger supply of contraceptives, and better follow-up may encourage even more women to accept contraceptives after abortion and to continue using them (198, 289, 445).

Despite the importance of hospital and clinic postabortion family planning programs, their effect and even their extent in developing countries has been little studied. One exception is an evaluation of an intensive contraception education and supply program set up in 1969 in Barros Luco-Trudeau Hospital in Santiago, Chile. Volunteers held group talks illustrated with slides and also spoke individually with women who had been treated for abortion complications. Contraceptive acceptance rates were higher among women who received the educational program than among a control group of women who did not. Some 67 percent of the women who received the educational program accepted contraceptives either at discharge or follow-up visits, compared with 55 percent of the women in the control group, a statistically significant difference (183).

Contraceptive Methods

The need and desire of many women for effective postabortion contraception raises the question of which methods are most appropriate after abortion and, more specifically, after complicated abortions. Considerable research shows that the major effective methods of contraception — the IUD, oral contraceptives, and sterilization — all are safe and effective immediately after legal abortion. By contrast, the further issue of appropriate methods for use after complicated abortion — an issue of importance to many developing countries — has received little attention.

Even in hospitals where family planning programs do exist, physicians often wait two to six weeks after abortion before they will insert an IUD, perform tubal ligation, or prescribe oral contraceptives (206). Evidence to date does not justify the delay. Unless a woman uses a barrier method successfully in the interim, such a delay can pose greater risks for the woman than any dangers associated with immediate postabortion contraception. The possibility of an unwanted pregnancy, while slight, clearly exists. It has been estimated that roughly 75 percent of women ovulate within 20 days after an abortion (62), and approximately 6 percent of women will conceive within four to six weeks after abortion unless they are using contraception (365).

Furthermore, a substantial proportion of women do not return to hospitals for follow-up and so will miss the opportunity to obtain contraceptives. In one Peruvian hospital, for example, as few as 25 percent of the women returned for postabortion checkups (206). Other studies also report low follow-up rates for both postabortion and postpartum patients (133, 199). If a woman is to be fully protected from the risk of another unwanted pregnancy, contraception must be made available before hospital discharge (164).

IUD

The IUD is an effective method of reversible contraception that is convenient to use, requiring little action on the part of the woman once it is inserted (362). An impediment to wider use of the IUD in many areas, however, has been the difficulty of going to a clinic to have the device inserted. Since a woman having an abortion or being treated for abortion complications is already in a medical facility, she might welcome the opportunity to obtain an IUD. Only recently, however, has the IUD been offered to women after abortions (404).

For many years practitioners believed that the best time to insert an IUD was during or immediately after menstruation. Postabortion insertion was considered hazardous. In 1962, for example, Jack Lippes, developer of the Lippes Loop, advised a minimum interval of 60 days between abortion and insertion of an IUD (259). Physicians believed that the rate of uterine perforation would be higher if an IUD were inserted before uterine involution was complete (337). Physicians were even more reluctant to insert an IUD into an infected uterus, for fear it would aggravate the infection (404, 472). In 1977 the US Food and Drug Administration (USFDA) listed septic abortion as a contraindication to IUD insertion and recommended a delay of at least three months before insertion (505).

These assumptions have been challenged by research findings over the past decade. Studies in various countries have shown that postabortion IUD insertion does not lead to significantly lower continuation rates than postmenstrual IUD insertion (57, 337, 369, 452, 517, 519) (see Table 12), nor does it increase rates of complication associated with abortion (165, 199, 248, 332, 336, 374, 454, 487, 517) (see Table 13). (Some of these studies compare postabortion insertion with postmenstrual insertion since the latter has been considered ideal. In a large study by the US Center for Disease Control, however, insertion immediately after menstruation showed no significant advantages over insertion at any other time during the menstrual cycle (527). In fact, the earlier in the menstrual cycle that the IUDs were inserted, the higher the rates of expulsion and pelvic infection.)

The assumption that IUDs should not be inserted for 60 to 90 days after an abortion has unnecessarily limited the contraceptive options open to women treated for incomplete abortions. In the late 1960s a double-blind study to assess the risks of postabortion IUD insertion was conducted at Felix Bulnes Hospital, Santiago, Chile, with 584 women hospitalized for spontaneous or illegally induced abortion (165). The women were randomly assigned into two groups: one group had the

Table 12. Complication Rates for Postabortal, Postmenstrual, and Postpartum IUD Insertion, Selected Studies, 1975-1978

Region & Country	Ref. No.	Follow-up Interval			Timing of Insertion		
					Post-abortal	Post-menstrual	Post-partum
ASIA							
India	369	1 year		**No. of women**	238	250	254
				% followed up	94	95	95
			Event Rates[a]	**Pregnancy**	0.5	0.9	0.0
				Expulsion rate	5.2	2.7	9.4
				Removal (medical)	5.2	5.2	3.1
				Continuation rate	73.5	81.2	74.5
EUROPE							
Denmark	452	3 months		**No. of women**	71	78	
				% followed up			
				Continuation rate[a]	86	87	
Sweden	337	1 year		**No. of women**	245	368	
				% followed up		96	
			Event Rates[a]	**Pregnancy**	0.4	2.7	
				Expulsion rate	5.3	2.4	
				Removal (medical)	13.9	8.7	
				Continuation rate	78.8	82.4	
WESTERN HEMISPHERE							
Chile	517	8-35 days		**No. of women**	1,561		1,761
				% followed up	15.6		19
			Event Rates[a]	**Expulsion rate**	3.7		8
				Removal (medical)	0.5		2.6
				Continuation rate	94.3		82.9
	519	1 year		**No. of women**	1,666		1,228
				% followed up	70.4		85.5
			Event Rates[a]	**Expulsion rate**	11		8
				Removal (medical)	6.3[b]		2.6
United States	57	1 year		**No. of women**	696	3,008	666
			Event Rates[a]	**Pregnancy**	3.7	2.9	6.7
				Expulsion rate	10.7	7.2	12.4

[a] Expressed as number of cases per 100 women at time of follow-up.
[b] Women involved had been admitted to hospital with septic abortions.

Table 13. Complication Rates for Abortion and for Abortion Plus IUD Insertion, Selected Comparative Studies, 1972-1978

Region & Country	Ref. No.	Group	Follow-up Interval	No. Cases	Percentage Followed-up	Event Rate (in %)			
						Bleeding[a]	Infection[a]	Reevacuation	Readmission
ASIA									
India	374	Control	7 days	185		6.0	1.62		
		IUD (TCu 200)		130		7.6	.77		
Korea	199	Control		1,124	33	8.1	5.1		
		IUD (Lippes Loop)		1,104	56	9.4	3.3		
EUROPE									
Finland	487	Control	0-8 weeks	144		1.4	7.6		
		IUD (TCu 200)		154		0.6	4.5		
Sweden	249	Control	1 month	541	100	15			
		IUD (Cu-7)		551	100	8			
	336	Control	8 weeks	436	100	3.7	6.2		6
		IUD (Cu-7)	1 year	196	100	3.6	3.6		3.1
	454	Control	4 weeks	163					3.1
		IUD (copper devices)		143					3.5
United Kingdom	332	Control	1 year	718		.84		2.65	4.18
		IUD (Cu-7)		121	85.94	0		2.48	1.7
		IUD (Dalkon Shield)		121	83.47	0		1.65	0.8
WESTERN HEMISPHERE									
Chile	165	Control	25-35 days	292[b]		28	4.4		
		IUD (Lippes Loop D)		292[b]		33	2.0		

[a] Definitions and criteria vary among studies.
[b] All women had been treated for abortion complications.

Lippes Loop D inserted before hospital discharge, and the other received no contraception. Both groups of women believed they had been fitted with IUDs even though one group had not, an aspect of the study that has been criticized.

No medically important differences between the two groups were detected when, approximately one month after discharge, 84 percent of the women returned for follow-up appointments. There were no significant differences in duration or amount of bleeding, abdominal pain, or gynecological abnormalities. No pregnancies were detected. There were two differences between the groups: the women with IUDs had a shorter interval between curettage and first menstruation and a heavier menstrual flow compared with previous menses than did women without IUDs. The researchers concluded that postabortion IUD insertion is a "necessary adjunct to more effective family planning services" (165).

Similar conclusions have been reached in research involving women obtaining legal abortions in Sweden (249, 336), Korea (199), Finland (487), India (374), Chile (517), and the US (67, 404). In two studies women whose IUDs were inserted immediately after abortion had fewer postoperative complications than women without IUD insertions after abortion (249, 487) (see Table 13).

The assumption that inserting an IUD into an infected or potentially infected uterus will aggravate infection has not been confirmed. A large international study by the Population Council reviewed data on 2,388 women hospitalized for incomplete abortions in five clinical centers in several developing countries. The researchers estimated that approxmately 80 percent of the abortions had been illegally induced. Women randomly assigned to use IUDs were compared with those without IUDs with respect to hospitalization and extent of fever. There were no differences between the women with and those without IUDs (472).

While IUD insertion may not aggravate infection, IUD performance may be slightly impaired after septic abortion. Observing over 2,200 Chilean women for one year after IUD insertion, Benjamin Viel and Sonia Lucero noted higher rates of IUD expulsion and of removals for medical reasons in women hospitalized for illegal abortions than in women with IUDs inserted after menstruation — 6.3 versus 2.6 percent. The researchers concluded, however, that this difference was not great enough to warrant discontinuing IUD insertion after abortion (519).

A second study in Chile compared complication rates among women receiving IUDs after both septic and aseptic abortions. The women with septic abortions had a higher rate of reinfection in the month after insertion, but the infections were not serious enough to require removal of the IUD. The researchers concluded that IUD insertion after septic abortion is safe as long as it is combined with antibiotic therapy both prior to D&C and after insertion (69).

Immediate protection from pregnancy is the most important benefit of inserting an IUD immediately after abortion. In addition, there may be other medical advantages to IUD insertion at this time. The woman has usually received some form of analgesia or anesthetic, her cervix is dilated, and, since the side effects of bleeding and cramping that sometimes occur with IUD insertion may also be present after abortion, women need not face these problems twice (164). The risk of perforation may also be decreased, since the physician is already familiar with the dimensions of the uterine cavity (249). Finally, women are often more motivated to accept contraception immediately after treatment for an induced abortion than at other times (57, 70, 164, 183, 336, 374).

Despite these advantages, many practitioners still hesitate to insert IUDs immediately after abortion. An international survey conducted in 1976 by the International Planned Parenthood Federation (IPPF) and the US Center for Disease Control (CDC) showed that about one-third of the 240 respondents — clinicians, program managers, researchers, and other recipients of the *IPPF Medical Bulletin* — limited IUD insertion to menstruation or five days thereafter. Moreover, respondents from areas where abortion is not available on request were the most likely to limit insertion to menstruation because they feared that women would conceal early pregnancies and request IUDs in the hope that they would cause abortions (528). Thus, many women are denied effective contraception at a time when they are most motivated to accept it.

Sterilization

Female sterilization is a safe, effective, and permanent means of fertility control which has become an accepted and important part of many national family planning programs. While traditionally female sterilization was performed only after childbirth (postpartum) and only for medical reasons (440, 531), changing attitudes and new legislation have led to increased demand for sterilization by nonpregnant women (interval sterilization) and by women undergoing abortions.

The increased demand for postabortion sterilization has led to a debate over the safety of combining the two procedures. The basic question that remains unresolved is whether the complication rates for sterilization immediately after abortion are greater than the sum of the complication rates for the two procedures performed at different times (98, 135, 483). Some researchers have claimed that sterilization immediately after abortion leads to greater mortality and morbidity than two separate procedures (63, 192, 201, 352, 462). Other investigators argue that it does not (91, 97, 98, 108, 145, 250, 305, 328, 372, 453, 541).

A recent World Health Organization collaborative study conducted in Singapore was designed specifically to examine whether the risk of abortion plus immediate sterilization is greater than the sum of the risks of abortion and sterilization at separate times. The study concluded that the risk of the combined procedures was not greater (97).

In this study, women who had requested abortion and sterilization and who were willing to participate in a prospective study were randomly assigned to one of two groups. Women in the first group had combined abortion and sterilization procedures; women in the second group (interval group) were sterilized six weeks after receiving abortions. Women in the two groups were comparable in age, parity, gestation, ethnicity, and health status. Vacuum aspiration, minilaparotomy, and lumbar epidural anesthesia were used for all women in both groups. Complications were reported separately for the abortion and sterilization procedures (see Table 14). With abortion plus sterilization, women had slightly lower complication rates for both the abortion and the sterilization — 3.8 percent and 5.3 percent, respectively — than women who had sterilization six weeks after their abortion — 6.7 and 6.9 percent, respectively. The differences in rates were not statistically significant for either procedure (97).

Other research on the safety of combining abortion and sterilization has not been as carefully controlled as the World Health Organization study, nor has it specifically addressed the issue of whether the complications of abortion and sterilization combined are greater than the sum of the complications of two separate procedures. Generally, two kinds of studies have been undertaken: (1) those comparing abortion plus immediate sterilization with interval or postpartum sterilization alone (see Table 14) and (2) those comparing abortion alone with abortion plus immediate sterilization (see Table 15).

Unfortunately, the comparability of many of these studies is limited. Definitions of morbidity vary (134, 164, 531), different types of sterilization procedures and anesthesia were used, and the groups compared were not always matched for factors that affect morbidity, such as age, health status, parity, gestation, and type of abortion procedure (98, 134). In addition, differences in practitioners' experience and ability and in the facilities available can bias study results (531).

Studies comparing complication rates for interval sterilization and for sterilization plus abortion generally find little difference (see Table 14). In two studies, in fact, complications were slightly less common for women undergoing combined procedures than for those undergoing sterilization only (91, 97). Only one study involving legal abortion found significantly higher risks with sterilization after abortion than with interval sterilization (192). Most of these studies involve abortions performed by medical personnel and so are not directly applicable to women being treated for complications of illegal abortion. They suggest, however, that a sterilization procedure would not add substantially to the risks already faced by a woman who has had an illegal abortion.

A recent World Health Organization study concluded that sterilization immediately after legal abortion is no more dangerous than sterilization and legal abortion performed separately, but little research has been done on the safety of sterilization after treatment for complications of abortion, whether illegally induced or spontaneous. (Chernush/World Bank)

Table 14. Complication Rates for Sterilization after Abortion and for Sterilization Only, Selected Comparative Studies, 1974-1979

Region & Country	Ref. No.	Procedure	Type of Procedure	No. of Women	% of Women with Complications Due to: Abortion	% of Women with Complications Due to: Sterilization
ASIA						
India	180	Interval sterilization	Colpotomy	196		6.0
		Sterilization + abortion	Colpotomy + vacuum aspiration	422	3.0	9.4
Singapore	97	Interval sterilization	Minilaparotomy	131	6.7[a]	6.9
		Sterilization + abortion	Minilaparotomy + vacuum aspiration	211	3.8	5.2
	250	Interval sterilization	Laparoscopic clip or ring	68		1.5
		Sterilization + abortion	Laparoscopic clip or ring + D&C or vacuum aspiration or hysterotomy	363 96	——3.0—— ——6.2——	
EUROPE						
United Kingdom	91	Interval sterilization	Laparoscopic electrocoagulation	11,459		2.7
			Laparoscopic electrocoagulation & division of tubes	8,053		3.2
		Sterilization + abortion	Laparoscopic electrocoagulation + "vaginal termination"	1,672	——2.3——	
			Laparoscopic electrocoagulation & division of tubes + "vaginal termination"	1,051	——2.6——	
WESTERN HEMISPHERE						
Latin America (6 countries)	106	Interval sterilization	Laparoscopic ring	1,281		2.0[b]
		Postpartum sterilization	Laparoscopic ring	120		4.1[b]
		Sterilization + abortion	Laparoscopic ring + abortion	517	[c]	2.3[b]
		Interval sterilization	Laparoscopic electrocoagulation	5,323		2.5[b,d]
		Postpartum sterilization	Laparoscopic electrocoagulation	391		4.9[b,d]
		Sterilization + abortion	Laparoscopic electrocoagulation + abortion	163	[c]	6.7[b,d]
United States	192	Interval sterilization	Laparoscopy & various occlusion methods	283		7.7[e]
		Sterilization + abortion	Laparoscopy + vacuum aspiration	82	——23[e]——	
			or $PGF_{2\alpha}$ (2nd trimester)	38	——23[e]——	

[a] Women had vacuum aspiration abortions followed by interval minilaparotomy sterilization six weeks later.
[b] Surgical complications only
[c] All women were being treated for complications of incomplete abortion.
[d] Differences among complications rates for electrocoagulation are statistically significant.
[e] Difference between complication rates for interval sterilization and sterilization + abortion (both methods combined) is statistically significant.

Studies comparing complication rates for abortion only with complication rates for abortion plus sterilization, which are less relevant to countries where abortion is illegal, report a wide range of results. As Table 15 shows, four studies comparing complication rates from abortion only with complication rates from abortion plus sterilization found only slight differences (97, 108, 145, 177), while four studies found that at least twice as many women had complications from abortion plus sterilization as had complications from abortion alone (311, 460, 462, 486). These eight studies involved four different abortion procedures and four types of sterilization, including both abdominal and vaginal routes. Consequently, differences in rates of complications are difficult to assess.

Recent research suggests that, apart from these medical complications, there may occasionally be psychological contraindications to performing sterilization immediately after abortion. The stress of an unwanted pregnancy may bias a woman's decision to be sterilized. A small percentage of women express regret after postabortion sterilization (440, 531). In a review of 22 studies published between 1949 and 1969, Winston Schwyhart and S. Jerome Kutner found that 8.4 percent of a total of 1,625 women sterilized immediately after abortion regretted the sterilization, compared with 5 percent of women receiving interval or puerperal sterilization (431). This difference, although slight, indicates that health care providers serving women who have had abortions need to inform women clearly and carefully that sterilization is a permanent form of fertility control. After abortion, as at all other times, women should be given accurate information without coercion before they make a decision on sterilization (201, 481).

Illegal Abortion and Concurrent Sterilization

Little research has been conducted on the risks of sterilization immediately after treatment for complications of illegally induced or septic abortion, a question of great importance where abortion is legally restricted. Angel Quan and colleagues observed 189 women admitted to the Maternity Hospital of El Salvador for treatment of inevitable or incomplete abortion who underwent laparoscopic sterilization before hospital discharge. They speculated that most of the abortions were illegally induced. Type 1 septic abortion (infection confined to the uterus) was diagnosed in 10 percent of the women. In these cases antibiotics were administered and laparoscopic sterilization was delayed until their temperatures returned to normal. In all cases, laparoscopic sterilization was performed within 48 hours of curettage. The rate of complications was low — 3.2 percent. The most frequent problem was tears of the fallopian tubes. The researchers concluded that laparoscopic sterilization after inevitable or incomplete abortion was as safe as interval sterilization (373).

A second study, conducted in six hospitals in Latin American countries where abortion is illegal, compared complication rates in 680 women sterilized after treatment for incomplete abortion with complication rates in 6,604 women undergoing interval sterilizations. Among those sterilized after treatment for abortion were 46 cases of septic abortion. These women had approximately the same rate of complications as women whose abortions were not infected (106).

In the same study, women sterilized by laparoscopy with tubal rings after treatment for abortion complications had no higher rate of subsequent complications than women receiving interval sterilization, but, when electrocoagulation was used, complications were higher after abortion (106) (see Table 14). The difference, while statistically significant ($p<.05$), was slight (106).

A precise determination of the comparative risks of abortion and sterilization performed together or separately has yet to be made. For countries where abortion is illegal, even more important would be determining whether sterilization at the time of treatment for abortion complications causes more complications than does sterilization at other times. While the comparative risks of combining procedures may vary in different countries and under different circumstances, there are advantages to combining sterilization either with legal abortion or with treatment for complications of illegal abortion that may outweigh any slight additional risks:

- The woman faces only one exposure to anesthesia (97, 98).

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KEEP THE BALANCE

Women receive family planning counseling and supplies at a hospital in Kenya. Hospitals could help prevent abortions by offering contraceptives to women treated for abortion complications. There is little evidence, however, that most do. (Chernush/World Bank)

Table 15. Complication Rates for Legal Abortion and for Legal Abortion with Sterilization, Selected Comparative Studies, 1971-1975

Region & Country	Ref. No.	Procedure	Type of Procedure	Number	% of Women with Complications
ASIA					
India	311	Abortion	Vacuum aspiration	68	7.3
		Abortion + sterilization	Vacuum aspiration + colpotomy	340	14.1
Singapore	98	Abortion	Vacuum aspiration	1,805	4.3[a]
		Abortion + sterilization	Vacuum aspiration + various sterilization techniques	616	5.2[a]
EUROPE					
United Kingdom	460	Abortion	Vacuum aspiration	63	0
		Abortion + sterilization	Vacuum aspiration + electrocoagulation	72	8.3
	177	Abortion	NA	40	7.5
		Abortion + sterilization	NA + laparoscopy	19	10.5
		Sterilization only	Laparoscopy	20	5.0
WESTERN HEMISPHERE					
Canada	108	Abortion	D&C	947	.63
		Abortion + sterilization	D&C + colpotomy	394	1.3
United States	145	Abortion	Vacuum aspiration	195	7.2
		Abortion + sterilization	Vacuum aspiration + laparoscopic electrocoagulation or clips	108	9.2
	462	Abortion	Vacuum aspiration	3,482	4.9[b] 2[c]
		Abortion + sterilization	Vacuum aspiration + NA	112	26[b] 18[c]
	486	Abortion	Vacuum aspiration	50,352	4.2
		Abortion + sterilization	Vacuum aspiration + abdominal tubal ligation	380	20.3
			+ colpotomy	131	13.7
			+ laparoscopy	266	5.3
		Abortion	D&C	3,077	6.0
		Abortion + sterilization	D&C + NA	48	16.7
		Abortion	Saline (2nd trimester)	13,946	23.4
		Abortion + sterilization	NA	108	25.0
		Abortion	Hysterotomy (2nd trimester)	96	33.3
		Abortion + sterilization	Hysterotomy + NA	683	33.4

NA = Not available

[a] Difference in complication rates between abortion-only group and abortion + sterilization group was not statistically significant

[b] Percentage with hemorrhage, defined as "blood loss greater than 500 ml"

[c] Percentage with febrile response, defined as "temperature greater than 38°C for more than 12 hours"

- Only one hospital admission or trip to a medical facility is required (97, 98, 145).
- There is no risk of pregnancy occurring in an interval between abortion or treatment for complications and sterilization (541).

Oral Contraceptives

Oral contraceptives are among the most effective methods of contraception and one of the most popular as well. More couples around the world rely on oral contraceptives than on any other effective contraceptive method except sterilization (229, 582). The popularity of "the pill" favors its inclusion in contraceptive programs for women treated for abortion complications.

Taking OCs after abortion appears to be just as safe as taking them at any other time. Research has shown that oral contraceptives do not affect the duration of bleeding after abortion (359) or the process by which endometrial tissue regenerates after abortion. Comparison of postabortion endometrial biopsies from OC users and nonusers did show that retained decidua (mucous lining of uterus) and inflammation were slightly more frequent among the users. Also, an unusual glandular reaction was noted in a few users, but the importance of these findings is unknown (389).

The main question to be considered in using oral contraceptives after abortion is when to start (359). Some practitioners have delayed prescribing the pill after abortion on the grounds that blood clots are more common during the postpartum period and oral contraceptive use may aggravate this potential (164). This fear is based on hypothesis rather than evidence, however; no research has demonstrated that pill use after an abortion increases the incidence of blood clots (348).

In the absence of specific medical contraindications, practical considerations and the convenience of the user should prevail. The common practice of delaying oral contraceptives until the fifth day of the woman's first postabortion menstrual cycle creates several difficulties. Some women do not resume a normal menstrual cycle for several months, and others may bleed intermittently or continuously (164, 334), making menstruation difficult to identify. Also, delaying contraception increases the likelihood of pregnancy. It is most convenient for the woman to start using oral contraceptives on the day of the abortion. This allows her to begin effective contraception when her motivation to avoid pregnancy is greatest (359, 494).

ABORTION IN ASIA

Planning to meet the medical and contraceptive needs of women who have had illegal abortions requires at least an approximate estimate of the extent of illegal abortion and a knowledge of the women who obtain abortions as well as of the complications of illegal abortion. Such information can be obtained by a variety of methods, but its accuracy is always in doubt (see box, p. F-137). Most studies underestimate the actual frequency of illegal abortion due to the reluctance of women to report their experience. Furthermore, this reluctance may change over time, complicating the analysis of trends. Nonetheless, the many surveys and analyses conducted throughout the world do suggest some broad patterns and trends:

- Induced abortion is more common in Asia and Latin America than in the Middle East and Africa.
- Abortion is as common in some countries where it is illegal, particularly those in Southeast Asia, as in some countries where it is legal.
- Rates of illegal abortion are increasing in some developing countries.
- For the most part, the women in developing countries who have illegal abortions are older, married women with children who wish to end childbearing. The clearest exception may be Africa, where many women who have abortions are young and unmarried and rely on abortion to postpone childbearing.

Throughout Asia the legal status of abortion varies considerably. In three countries—the People's Republic of China, Singapore, and Viet Nam—abortion is legal on request. In a number of others abortion for a broad range of social and/or medical reasons is legal, although the actual availability of legal abortion may depend more on judicial interpretation and public perception of the law than on statutory language. In India women may obtain abortions legally for social as well as medical reasons, but the abortion must be performed by a certified physician in a specially licensed facility. In several countries—Hong Kong, the Republic of Korea (South Korea), Japan, Nepal, and Thailand — abortion is permitted if the woman's health is threatened by continuation of the pregnancy. South Korea permits abortion in cases of rape, incest, and possible fetal abnormality as well, as does Japan, which also recognizes socioeconomic reasons for abortion (501, 589).

Abortion laws are more restrictive in other Asian countries. In Bangladesh, Burma, Laos, Pakistan, and Sri Lanka, abortion is illegal except to save the woman's life. In Malaysia, abortion is legal to save a woman's life or for reasons of rape, incest, or fetal abnormality. In Taiwan, Indonesia, and the Philippines, abortion is illegal under any circumstances (501, 589).

The incidence of abortion in Asia is very high regardless of legal status (see Table 16). In South Korea, Thailand, and Taiwan — where abortion is illegal — and in Singapore and Japan — where abortion is legal — the abortion rates and ratios estimated from surveys of women and abortion providers and from government records are equivalent to or higher than those in the United States and in other developed countries where abortion is legal. They are exceeded only by those of Eastern European nations. For example, in 1976 Singapore reported an abortion rate of 27.5 abortions per 1,000 women age 15-44 and a ratio of 371 abortions per 1,000 live births (483). In South Korea, based on surveys of currently married women age 15-44, the abortion rate for 1975 was estimated at 64.4 abortions per 1,000 married women, and the abortion ratio, at 667 abortions per 1,000 live births (356). The corresponding figures for the United States in 1977, based on government statistics, were an abortion rate of 22.2 per 1,000 women age 15-44 and a ratio of 329 abortions per 1,000 live births annually (502).

Country & Date	Ref. No.	Legal Status	Annual Abortion Rate	Annual Abortion Ratio
Singapore 1976	483	Legal	27.5	371
South Korea 1975	356	Illegal	64.4	667
Thailand (rural) 1978	478	Illegal	37	245
United States 1977	502	Legal	22.2	329
Hungary 1976	483	Legal	41.5	520

The incidence of illegal abortion is determined not only by legal status but also by the accessibility of abortion services and the public awareness of the law. In South Korea and Taiwan, for example, the grounds for legal abortion are restricted, but abortion is widely practiced because services are readily available. In India, on the other hand, abortion is legal for sociomedical reasons but not readily available.

India

Since India liberalized its abortion laws in 1972, the number of legal abortions has increased yearly, but substantial numbers of illegal abortions still take place. In 1972, 24,000 legal abortions were recorded; by 1977 the number had risen to 278,073 (171). No national statistics are available, but illegal abortions are estimated still to total 4 to 6 million yearly (120, 171, 238, 274, 315).

Indian women continue to resort to illegal abortion for several reasons:

- lack of information about abortion services (92, 223, 238, 351, 446)
- limited publicity about the law and the widely held misperception that abortion is illegal (92, 171)
- lack of adequate facilities and certified medical practitioners who meet the requirements of the law, particularly in rural areas (49, 351, 446)
- drawbacks in abortion services provided at approved centers — long waiting periods, lack of privacy, impersonal atmosphere, inadequate follow-up (120, 238)
- reluctance of unmarried women to go to hospitals and clinics for abortions (49).

Since access to legal abortion is limited, illegal abortion remains a major health problem. Septic abortions and subsequent complications cause between 15 and 25 percent of maternal deaths in a number of Indian hospitals (223, 238, 269, 351, 360, 446) (see Table 1). The majority of women hospitalized for abortion complications have turned to *dais* (traditional midwives) for their abortions or induced their own abortions (51, 94, 328). Among these women, the most common method for inducing abortion is introducing a stick, sometimes coated with arsenic or phosphorus, into the uterine cavity (50, 223). As might be expected, the women who develop the most serious complications of abortion are those least able or willing to seek professional medical care. M. Kochhar reports that at Kasturba Hospital, Delhi, "Septic abortion was mostly seen in unmarried, young girls who had interference done in the 2nd trimester by untrained personnel and were admitted in serious condition" (233).

South Korea

The situation in South Korea contrasts with that in India. Although abortion is legally restricted in South Korea, it is so common that many Koreans believe it is legal on request (198, 297). The Maternal and Child Health law, enacted in 1973, which permits abortion in cases of risk to maternal health, rape, incest, and possible fetal deformity, is relatively restrictive in its wording but has been seen as a legalization of abortion (181). Both before and since the 1973 law, however, physicians have routinely performed abortions in their private offices and clinics, and whether the 1973 legal change had any effect on actual practice is unknown (197, 198).

Table 16. Incidence Rates and Ratios of Legal and Illegal Abortion in Asia, Selected Studies, 1970-1979

Country	Ref. No.	Legal Status of Abortion	Period & Source of Data	Abortion Rate: Abortions per 1,000 Women 15-44	Abortion Ratio: Abortions per 1,000 Live Births
LEGAL ABORTIONS					
India	483	Legal	1977, official statistics	2.2[a]	11[a,b]
Japan	483	Legal	1976, official statistics	24.9	372[b]
Singapore	483	Legal	1976, official statistics	27.5	371[b]
Hong Kong	483	Illegal except when women's health is threatened	1976, official statistics	2.3[a]	27[a,b]
ILLEGAL ABORTIONS					
Korea, Republic of	198	Illegal except when woman's life or health is threatened	1970, survey of 4,216 ever-married women, 20-44	80[c]	400[c]
	356	Illegal except when woman's health is threatened or in case of rape, incest, fetal damage	1976, survey of 5,008 currently married women, 15-44	64.4	667
Seoul	198	Illegal except when woman's life or health is threatened	1970, survey of 925 ever-married women, 20-44	104[c]	520[c]
	197	Illegal except when woman's health is threatened or in case of rape, incest, fetal damage	1978-79, survey of 726 abortion providers	235	2,750
Malaysia	449	Illegal except when woman's life is threatened	1973, survey of 9,506 ever-married women, 15-44	NA	190
Taiwan	464	Illegal	1973, survey of 331 abortion providers	NA	594-736
Thailand	111	Illegal except when woman's health is threatened and in cases of rape, incest	1972-1973, records from all provincial hospitals	28[d]	NA
Chiang Mai	441	Same as above	1977, survey of 1,921 ever-married women, 15-44	24	NA
Chiang Rai	441	Same as above	Same as above	7	NA
Rural areas	478	Same as above	1978, survey of 81 abortion providers	37	245.1

NA = not available

[a] Legal abortion only

[b] Live births: six months later

[c] Ever-married women age 20-44

[d] Per 1,000 women age 15-45

PROBLEMS OF DATA SOURCES FOR ILLEGAL ABORTION

Where abortion is illegal, most information on the extent of abortion and subsequent mortality and morbidity comes from four sources: (1) hospital admissions records, (2) surveys of women (3) surveys of abortion providers, and (4) death certificates. The extent of illegal abortion, nationally or regionally, has also been estimated using theoretical fertility models (143), hospital abortion mortality data (54, 202), and fertility rates, subtracting actual births from expected births (247, 514).

Hospital admissions records generally report the number of women admitted for treatment of abortion complications and the number of subsequent deaths in a given period. The principal advantages of hospital records are:

- Fluctuations may suggest trends in abortion incidence.
- If the proportion of abortions which require hospital care is known, abortion incidence can be estimated.
- They suggest minimum incidence and mortality.
- They indicate the direct public costs of illegal abortion.

The principal disadvantages of hospital records are:

- Hospitalized women represent only a proportion of all women obtaining abortions, and that proportion is difficult to estimate.
- Hospital records rarely differentiate between induced and spontaneous abortions. When they do, illegal abortions are undercounted since some women and attending physicians conceal induced abortions, calling them spontaneous (535).
- Hospital data can be inaccurate. In Bogotá, Colombia, for example, six hospitals, on three separate occasions and in response to three separate inquiries, reported the number of abortion-related admissions in 1976. The total number reported ranged from 7,782 to 12,182 (264).

Surveys of women inquire about reproductive histories and abortion experience. The main advantages are:

- If a nationally representative sample of women is selected and interviewed, the results can be extrapolated to the entire country and national prevalence rates determined.
- If a series of surveys is conducted over several years, trends in abortion prevalence may be detected.
- Regional or ethnic differences in abortion practice and the characteristics of women using abortion can be identified.
- An estimate can be made of the number and type of complications and the proportion requiring hospitalization.

The main disadvantages are:

- Surveys often underestimate the extent of abortion due to underreporting. Underreporting may be caused by fear of legal prosecution, forgetting past events, or a difference between the questioners' and respondents' definitions of abortion. For example, to many women in developing countries using medication to bring on a late period is not considered an induced abortion (331).
- Surveys are not always comparable due to differences in age and marital status of women surveyed, methods of gathering data, and ways of reporting results (160).
- Some surveys ask specifically about induced abortions; others ask about all abortions, spontaneous and induced. Where the two are distinguished, women may overreport spontaneous abortions to conceal induced abortions (523). Where they are not distinguished, data cannot be corrected to eliminate spontaneous abortions because the incidence of spontaneous abortion, while estimated at 15 to 25 percent of all pregnancies in the absence of induced abortion (225), is not certain.

Underreporting of past abortions is the most serious limitation of survey research. One way around this problem may be the randomized response technique (RRT), developed in 1965. The RRT enables respondents to answer sensitive questions without disclosing their answer to the interviewer. The RRT device is often a small plastic box containing a fixed number of beads of two different colors. The front of the box is imprinted with two questions, one concerning abortion, the other noncontroversial, both of which can be answered either yes or no. In a study done in North Carolina, for example, the noncontroversial question asked about the woman's month of birth (6). The woman shakes the box to allow a bead to roll into a window on the top of the box which only she sees. The color of the bead determines which question the woman answers. Her response is recorded by the interviewer, who does not know which question she is answering. Since the number of beads of each color is fixed, the probability that the abortion question will be answered is known. Thus the reported prevalence of abortion can be statistically determined (6, 522). The RRT has been adapted for use in different cultures and among illiterate women. In studies in Turkey and Taiwan almost twice as many women reported at least one induced abortion when they answered RRT questions as when they answered direct questions (100, 474). In Ethiopia the difference was even greater (104). RRT is still experimental, however, and not widely used.

Surveying abortion providers is a recent and, so far, rare form of abortion research, but it may prove to be the least biased method of estimating incidence and prevalence. Only four major surveys have been conducted — in South Korea (197), Thailand (478), Taiwan (464), and the Philippines (155). Provider surveys report higher rates of abortion than other research methods in the same countries. The advantages are:

- If providers' anonymity is guaranteed, they may be less likely to conceal information than their clients.
- Providers give information on both married and single women, not just married women, who are often the only ones questioned in surveys of women (197, 478).
- Cases of spontaneous abortion are excluded (478)

The main disadvantages are:

- In areas where most abortions are performed by nonmedical personnel identifying all providers is difficult.
- Women inducing their own abortions are not counted.
- Providers are not always aware of or may not admit the complications from the abortions they perform (478).

Death certificates indicate the number of deaths officially attributed to abortion in a country. Advantages are:

- They suggest a minimum figure for abortion mortality.
- Used carefully, the number of deaths attributed to abortion can sometimes serve as an indirect measure of the extent of abortion (367).

The major disadvantages of death certificates are:

- In developing countries, many deaths are not registered at all.
- The completeness and validity of death registration varies in different countries, making comparisons unreliable.
- Falsification of records and incorrect certification are very common, particularly for deaths due to abortion.

The prevalence of abortion in Korea has increased substantially in the last two decades. National surveys of married women of reproductive age document a sixfold increase in the percentage of women reporting ever having had an induced abortion, from 7 percent in 1964 to 39 percent in 1976 (181, 198, 236, 356). Even so, abortion prevalence estimated from national surveys of women may be far below the actual figure. A 1977-78 survey of 726 providers of abortion services in Seoul — one-third of all providers of medical services in the city — found that Seoul residents obtained approximately 480,000 abortions in that time period, five times the number estimated for 1970 from a national survey of women (197, 198). The 1977-78 researchers, Sung-Bong Hong and Christopher Tietze, attribute the increase in the number of abortions chiefly to a much higher rate of abortions rather than to the increase in Seoul's population.

The abortion rate and ratio derived from the survey of providers are far higher than previous estimates based on surveys of women. According to the survey of providers, the abortion rate in Seoul in 1977-78 was 235 abortions per 1,000 women age 15-44 and the abortion ratio was 2,750 abortions per 1,000 live births. By comparison, according to the 1971 survey of women, the rate in Seoul in 1970 was 75 abortions per 1,000 women and the ratio was 750 per 1,000 live births, or only about one-quarter as high as in 1977-78 (197, 198). (The 1970 data were adjusted for underreporting based on results of a subsequent resurvey of a subsample of the group originally interviewed.)

Vendors of abortifacients and other folk medicines hawk their wares outside the Quiapo in Manila. Most of the abortifacients are herbs intended to bring on delayed menses. A bottle costs about $.25 (US).

Taiwan

In Taiwan, as in Korea, surveys of women show a marked increase in abortion prevalence in the last two decades. Between 1965 and 1976 the percentage of surveyed women acknowledging at least one induced abortion increased from 9 to 21 percent (469). Even these figures probably understate the extent of illegal abortion in Taiwan. A 1971 study in a Taiwanese county compared two methods of eliciting information on abortion experience: direct questioning and the randomized response technique (RRT) (see box, page F-137). Of the women answering through the RTT, 28.2 percent admitted having had an abortion, compared with 12.9 percent of the women answering a direct question (100).

A provider survey in Taiwan in 1973, covering almost half of the nation's clinics and maternal health care providers, indicated a ratio of 594-736 abortions per 1,000 live births (464). This is higher than the ratios in most of Asia, except Korea.

Malaysia

While in Malaysia abortion is legally permitted only when the woman's life is endangered by the pregnancy, both hospital admission records and surveys of women indicate that illegal abortion is increasing. The number of women with abortion complications admitted to University Hospital in Kuala Lumpur doubled between 1969 and 1974, while admissions for deliveries increased by 24 percent. Almost one-third of the maternal deaths occurring during this period were due to induced abortion (333).

In a 1973-74 national survey of 9,506 ever-married women age 15-44, almost 11 percent reported having had one or more induced abortions (449). Between 1970 and 1973 the reported abortion ratios increased markedly, from 63 to 190 abortions per 1,000 live births. While abortion is more common in urban than rural areas, the abortion ratio tripled between 1970 and 1973 in both rural and urban areas (449).

Philippines

Despite legal and religious prohibitions against abortion in the Philippines, surveys reveal that many women are terminating unwanted pregnancies. In a 1967-69 survey in the province of Laguna, 13 percent of 4,787 ever-married women reported having had an abortion or stillbirth in the previous five years. Further questioning of a subgroup of the women found that 28.5 percent admitted having had at least one abortion in her lifetime (509). In 1976, 676 married women in five barrios in Cavite Province, a predominantly rural area, were surveyed; 17 percent admitted having had at least one induced abortion; 4 percent, more than one induced abortion. Despite the cost and inconvenience of hospitalization for people in the barrios, women were hospitalized after 12 percent of the induced abortions (146).

In 1979 surveys of 106 abortion providers and 286 women from four areas of the Philippines — Northern Luzon, Central and Southern Luzon, the Visaijas, and Mindanao — found that the providers treated about 1,300 clients per month. The average monthly caseload per provider ranged from a high of 37 women in metropolitan Manila to a low of 3.8 women in Northern Luzon province (155). The providers included physicians, midwives and nurses, traditional midwives and healers, and nonliterate housewives with no training in either modern or traditional medicine. The majority of the surveyed women first tried to induce menses with medications, and when these methods failed went to abortion providers. More women obtained their abortions from traditional midwives or persons with no health care background than from trained medical personnel (155).

Thailand

A 1978 survey of abortion providers in rural Thailand (478) reported higher rates of illegal abortion — 37 abortions per 1,000 women — than had been previously estimated from surveys of rural women in northern provinces (441) and from national hospital admissions records (111) (see Table 16, p. F-136). This abortion rate, while lower than the rate reported in South Korea in 1975, is higher than the 1976 rate in Singapore, where abortion is legal. Some 81 practitioners from 51 rural Thai districts were interviewed. The practitioners — many of them young, educated women and wives of government civil servants, others traditional midwives — reported several different methods of varying effectiveness for inducing abortion: massage, injecting solutions into the uterus through a catheter, curettage, and inserting shrub roots and grass stems into the vagina. Based on the reports of these practitioners, the researchers estimated that 298,945 illegal abortions take place annually in the rural areas of Thailand. This figure represents a rate of 37 abortions per 1,000 women age 15-44 and a ratio of 245 abortions per 1,000 live births (318, 478).

Bangladesh

Although induced abortion is illegal in Bangladesh except to save the life of the pregnant woman, hospital admission records and surveys of rural health workers indicate that abortion is common and is responsible for a substantial number of maternal deaths. In 1977 and 1978 three hospitals recorded abortion-related admissions ranging from 640 cases in 12 months to 479 cases in 5 months. The proportion of these women acknowledging having had induced abortions varied from 6 percent to 62.5 percent (44, 52, 214).

A survey of clinicians and health workers in rural Bangladesh during a 6-month period in 1978 and 1979 found that abortion complications account for a high proportion of all maternal deaths (395, 397, 403). Interviews were conducted with at least 1100 health workers in about 795 health care centers. The health workers reported a total of 1,590 cases of abortion complications, including 498 deaths, and 1,092 other pregnancy-related deaths. Based on these interviews from rural areas, it has been estimated that approximately 6,000 maternal deaths occur annually in Bangladesh, approximately one-fourth of which may be due to abortion. Most abortions in Bangladesh are induced by *dais*, and the most common method is inserting a stick or tree root into the uterus (395, 397, 529).

Characteristics of Women Having Abortions

In many Asian countries information from surveys of women and from hospital records indicates that most women who seek abortions are married, over age 25, and have several living children (12, 44, 47, 52, 53, 94, 103, 146, 198, 214, 225, 235, 236, 356, 360, 403, 467, 469, 483). Asian women who obtain abortions generally do so after they have achieved their desired family size.

Surveys of abortion providers in Thailand and Korea offer indirect evidence that many unmarried women are seeking abortions as well. In the Thailand survey, for example, 45 percent of the rural practitioners reported that they serve mostly single women (478). In Korea the abortion rates estimated from the 1977-78 provider survey in Seoul are extremely high compared with rates reported in earlier surveys of women in part because of the inclusion of unmarried women in the total count of women having abortions (197).

In the countries where national surveys have been conducted — Malaysia, Korea, and Taiwan — induced abortion is more prevalent in urban than in rural areas (103, 198, 356, 449). According to the 1970 survey in Korea, for example, the abortion rate among married urban women age 20-44 was 55 abortions per 1,000 women, compared with a rate of 46 among rural women (198). In Malaysia in 1974 the lifetime induced abortion ratio among urban women — 76 abortions per 1,000 live births — was four times as high as the ratio among rural women — 18 abortions per 1,000 live births (449).

The apparently greater prevalence of abortion in urban areas may be due both to better access to abortion providers and facilities and to greater willingness among urban women to report abortions as well as to greater demand (449). The surveys of providers and family health workers in Thailand (478) and Bangladesh (397, 403) indicate that a wide network of abortion services exists in rural areas.

In Korea, Malaysia, and Taiwan, high prevalence of abortion is associated not only with residence in urban areas but also with education. In both urban and rural areas in all three countries, abortion is less common among women with no education (148, 198, 356, 449). The Korean World Fertility Survey showed that socioeconomic status, measured by husband's occupation, also is related to abortion. The percentage of women reporting abortions, the mean number of abortions per woman, and the total number of abortions per 1,000 live births all tend to increase with the wife's education and with the husband's occupational status (236, 483).

ABORTION IN THE MIDDLE EAST

With the exception of Tunisia, where abortion is available on request, abortion laws in the Middle East are highly restrictive. Influenced by Islamic law and colonial tradition, most countries permit abortion only if the woman's life or health is threatened by continuation of the pregnancy (483). Cyprus, Egypt and Turkey permit abortion in cases of possible damage to the fetus; Cyprus, Turkey and Jordan authorize abortion in cases of rape (589).

The laws, while restrictive, are rarely enforced. As a result, physicians perform illegal abortions in private clinics and hospitals (161, 246, 310, 323). In Egypt physicians in large medical centers are inducing abortions for women who have become pregnant with IUDs in place even though, if prosecuted and convicted, they could receive sentences of life imprisonment at hard labor (325, 466). In a 1975 Turkish survey 211 women reported a total of 462 induced abortions; 64 percent of the abortions had been performed by physicians in their offices and 14 percent by physicians in hospitals (477). Performing illegal abortions is a major source of income for some physicians and midwives in the Middle East. Thus, some may have been opposed to the dissemination of effective contraceptives and the easing of legal restrictions on abortion (277, 323).

In Pakistan as in most Islamic countries, abortion is permitted only to preserve a woman's life. (USAID)

Most information on the extent of illegal abortion in the Middle East dates back to the 1960s and early 1970s and is of poor quality. Hospital records and survey research were often limited to a few institutions or to selected groups of women in urban areas. Nevertheless, these data do suggest that in at least 10 countries abortion was widespread — Cyprus (470), Egypt (136, 137, 147, 222, 488), Iran (18, 247, 280, 321), Iraq (161), Jordan (116, 310), Kuwait (188), Lebanon (54, 105, 162, 184, 540), Morocco (246), Sudan (410), and Turkey (350, 468, 474, 477, 537). For example, a study in three major hospitals in Cairo and Alexandria, Egypt, from 1965 to 1969 found that between 496 and 575 women were admitted with abortion complications for every 1,000 women admitted in labor (222). A 1967 survey of over 3,800 teachers in Alexandria reported that 34.3 percent of the women who had ever been pregnant had had at least one spontaneous or induced abortion. Over 23 percent of all pregnancies ended in abortion (224). A study in Iran analyzed rural and urban age-specific fertility rates and contraceptive use and concluded that 25,000 to 33,000 abortions were induced in Teheran in 1966, or one abortion for every three to five live births (247).

More recent information on the extent of abortion in the Middle East is available for only two countries, Tunisia and Turkey. This information indicates that in the last decade increasing numbers of women have relied on abortion to prevent unwanted births.

Tunisia

In 1973 Tunisia legalized abortion in the first trimester of pregnancy as part of a program to control population growth (219, 546). Before 1973 illegal abortion was common. In 1968, for example, Tunisian hospital services reported 10,344 admissions for complications of illegal abortion (46). After legalization, the number of legal abortions increased from 6,500 in 1973 to 20,000 in 1976 and has since remained at approximately that level while contraceptive use has gained (322, 483, 521). Isam Nazer concludes:

> These changes reflect the increasing use of contraceptive methods in preference to and despite the easy availability of abortion. Abortion now appears to be used basically as a back-up in cases of contraceptive failure (322).

Turkey

Eleven nationwide or community surveys of married women document the high prevalence of illegal abortion in Turkey. Like all survey research on abortion, the Turkish studies must be interpreted cautiously, but they do suggest that the number of women having illegal abortions is increasing. Between 1963 and 1975 a series of four surveys of nationally representative samples of women found that the percentage of women admitting induced abortions increased from 7.5 to 13.9 (350, 474, 475). The actual prevalence of abortion is probably much higher. In 1975 Sabahat Tezcan asked two nationally representative samples of women, either by direct questioning or by the randomized response technique (RRT) (see page F-137), whether they had ever had induced abortions. Some 33 percent of the women interviewed by the RRT reported at least one induced abortion compared with only 14 percent of the women interviewed by direct questioning (474). Turkish women are believed to have the highest prevalence of illegal abortion in the Middle East because the desired family size is small and effective contraceptives are not widely available (476).

The nationwide surveys showed marked regional differences. In all surveys the proportion of women having induced abortion was highest in the metropolitan areas and lowest in the rural villages. In 1975, for example, one in every four women in the metropolitan areas reported an induced abortion, compared with one in 20 in the villages (477).

Characteristics of Women Having Abortions

Most Middle Eastern women who obtain abortions do so to limit family size. The women most likely to abort their pregnancies are married, over age 25, with three or more living children. The prevalence of abortion increases with age (224, 477). In a survey of 1,459 Lebanese women, those age 20-24 reported that 14.4 percent of their pregnancies had ended in abortion, while women age 40-44 reported 59.5 percent (105).

Pregnancy and illegal abortion among unmarried women seem to be relatively rare. In a hospital in Cairo, for example, only 11 of 147 women hospitalized after induced abortions reported that they were single, although it is possible that some single women misrepresented their marital status. None of the women hospitalized following spontaneous abortions was unmarried (136).

Female chastity before marriage is highly valued in Muslim cultures, and customs such as segregation of the sexes and female seclusion have evolved to maintain female virginity. A girl who becomes pregnant before marriage may be murdered by her male relatives (77). Under these circumstances, the likelihood is great that any premarital pregnancies that do occur will be aborted. In fact, the laws in several Muslim countries — Iraq, Egypt, Lebanon, Syria, and Jordan — include provisions to reduce penalties in cases where illegitimate pregnancies are aborted (324). The Jordanian law, for example, considers a woman who aborts herself to protect her reputation and family honor to have acted under mitigating circumstances (310). The attitude toward premarital pregnancies also means that abortions of premarital pregnancies are not likely to be reported in surveys.

In the Middle East, as in Asia, abortion is more common in urban areas and among the better educated (310, 468, 477). In Lebanon whether a woman is Muslim or Christian may be less important in determining abortion practice than education and residence. In a 1961 study, among Muslims over 30 percent of educated urban women reported having had induced abortions compared with 13 percent of uneducated urban women and 2 percent of uneducated rural women. Similar differences were seen among Christian women (540).

According to survey data from three countries (105, 321, 468, 477) and the opinions of practicing physicians (54, 161, 184, 310, 470), abortion is more common among women in upper and middle classes than in the lower classes (54, 161, 222, 310, 323). In 1970 and 1971 women in Lebanon, Iran, and Turkey were surveyed as part of a World Health Organization Collaborative Study on family formation patterns and health. In each country, middle class women reported a greater percentage of pregnancies ending in abortion than did lower class women (105, 321, 468).

ABORTION IN AFRICA

Abortion laws in most African countries south of the Sahara are a legacy of the region's colonial past (16, 341). With the exception of Zambia, most countries forbid abortion entirely or permit it only if the pregnant woman's life or health is threatened (341, 483, 501). In Zambia, the 1972 Termination of Pregnancy Act permits abortion when the pregnant woman's physical or mental health is threatened, in case of potential fetal deformity, and if additional childbearing poses a threat to the physical or mental health of her children (285, 483, 501).

Restrictive legislation and strong pronatalist traditions, especially in francophone Africa (346), have limited both the amount and reliability of research on illegal abortion. While it is difficult to obtain national statistics, illegal abortion is generally regarded as an increasing problem, particularly in urban areas (14, 20, 40, 72, 76, 266, 275, 414). African gynecologists agree that complications from spontaneous and illegal abortions are one of the most frequent causes of hospitalization among women of reproductive age (284). Relying on hospital records and the impressions of practicing physicians, a 1978 International Planned Parenthood Federation (IPPF) Africa Region workshop on abortion management agreed that:

- The increase in numbers of women hospitalized for abortion complications indicates a real increase in the incidence of abortion.
- Illegal abortions are a serious health problem in Africa.
- The problem will probably grow worse as more women try to control fertility.
- A comprehensive approach to prevention and management undertaken at the national level is needed (113).

Hospital Records

Hospital admissions records are the major source of information about abortion in Africa. Data on abortion-related admissions for three or more years may suggest trends, and, as Table 17 shows, in most of these hospitals the number of admissions

Table 17. Number of Admissions for Abortion Complications in African Hospitals Selected Studies, 1970-1979

Country	Ref. No.	Hospital	Year	No. of Abortion-Related Admissions
Ethiopia	16	Adeoyo Hospital, Ibadan	1965	453
			1966	615
			1967	754
Ghana	22	Korle Bu Hospital, Accra	1967	2,886
	25		1968	3,204
			1970	3,034
			1971	3,148
			1972	3,275
	296		1976	3,772
	25	Effia-Nkwanta Hospital	1970	835
			1971	885
			1972	824
		Koforidua Hospital	1970	345
			1971	408
			1972	255
Kenya	25	Kenyatta Maternity Hospital, Nairobi	1970	914
			1971	1,312
			1972	1,564
	275	Kenyatta National Hospital, Nairobi	1971	1,838
			1974	2,070
			1975	3,048
	296		1976	3,702
Mauritius	25	Civil Hospital	1970	1,028
			1971	593
			1972	751
		Victoria Hospital	1970	891
			1971	647
			1972	751
		7 rural hospitals	1970	350
			1971	498
			1972	668
	511	All hospitals	1973	2,013
			1974	2,285
			1975	2,479
			1976	2,515
Nigeria	16	Lagos Island Maternity Hospital	1962	1,700
			1963	1,800
			1964	1,600
			1965	2,100
			1966	2,200
			1967	1,900
	15	Lagos University Teaching Hospital	1964	171
			1965	194
			1966	122
			1967	157
	25		1970	177
			1971	196
			1972	229
Sierra Leone	597	Maternity and Connaught Hospitals, Freetown	1970	206
			1971	220
			1972	244
Uganda	266	Mulago Hospital, Kampala	1967	1,518
			1968	1,830
			1969	2,120
Zambia	285	University Teaching Hospital, Lusaka	1972	1,448*
			1973	1,592*
			1974	2,130*
			1975	3,075*
			1976	2,991*

Note: This table includes only those hospitals with records for 3 or more years. For other records see Ampofo (25), Akinla (16), Ojo (339).

*Includes legal abortions: 1972, 48; 1973, 88: 1974, 133; 1975, 165; 1976, 173.

for abortion complications has increased. For example, in Kenyatta National Hospital, Nairobi, Kenya, the number of abortion-related admissions doubled between 1971 and 1976, rising from 1,838 to 3,702. The number of septic abortions also doubled from 306 in 1971 to 611 in 1975 (275). In Korle Bu Hospital, Accra, Ghana, the number of abortion-related admissions increased by 31 percent between 1967 and 1976, from 2,886 to 3,772 (22, 296).

The greatest increase in admissions is found in Zambia, the only country in sub-Saharan Africa where abortion is legal. Between 1972 and 1976 the number of admissions for abortion complications at University Teaching Hospital, Lusaka, jumped 106 percent, from 1,448 to 2,991. An estimated one-third of the 2,991 women treated at University Teaching Hospital in 1976 had had illegal abortions (296). The number of legal abortions also rose but remained low; only 173 were performed in 1976 (285). These figures indicate that illegal abortion is continuing in Lusaka despite liberalization of the law in 1972. The increase in admissions for incomplete abortion, however, may also be due to the fact that legalization removes the stigma from abortion, making women more willing to seek medical treatment for abortion complications (284).

The requirements of Zambian law as well as the limited number of physicians and hospitals keep legal abortion inaccessible to many women. Under the 1972 law every abortion must be approved by three medical practitioners, including one specialist, and must be performed in a hospital except when an immediate procedure is necessary to save the woman's life or to prevent permanent physical or mental injury (285). Not all requests for abortion are granted. In Lusaka approximately 20 percent of requests are denied, and this proportion may be higher elsewhere (285). An acute shortage of physicians in Zambia—only one per 10,000 people in 1975—also prevents widespread implementation of the 1972 abortion law (535).

Fresh stalks of the jatropha plant contain a mildly corrosive sap. When stalks are inserted into the uterus, chemical reaction may start uterine bleeding. Also, the amniotic sac may be pierced. The combined effect may induce abortion. Asked to help choose plantings for the school grounds, girls at a secondary school in Ghana reportedly selected the jatropha plant (523). (Ghana Medical School, courtesy of D.A. Ampofo)

Using 1976 hospital records, Tegualda Monreal and colleagues estimated the annual incidence of induced abortion in seven African capital cities. The incidence rates, determined by a formula developed by the researchers, ranged from a low of 2.3 illegal abortions per 1,000 women in Kampala, Uganda, and Nairobi, Kenya, to a high of 15.3 in Yaounde, Cameroun (296). These figures are not reliable because it is difficult to determine the number of births in the cities, as needed for this method of estimation, and it is possible, as suggested both by the researchers and by participants in the 1978 IPPF Africa Region workshop, that women with spontaneous abortions are more likely to go to hospitals than women who have had illegal abortions (296, 413).

Surveys of Women and Men

Surveys have been conducted in the last two decades to determine knowledge, attitudes, and practice of contraception among African men and women in four countries — Togo (240), Nigeria (8, 74, 75), Sierra Leone (129, 185), and Ghana (56). In all four, fewer than 5 percent of the women admitted having had induced abortions. A considerably higher percentage of the respondents in most studies acknowledged knowing about traditional and modern methods of inducing abortions. For example, in 1969, 8,400 rural and urban men and women in Nigeria were surveyed. Only 2 percent of the men reported that their partners had undergone induced abortions, and only 1.3 percent of the women admitted having induced abortions. By contrast, 24 percent of the women and 38 percent of the men said they knew about modern and traditional abortion methods (75). Knowledge of abortion, of course, does not imply practice, but the large differential suggests that a considerable degree of underreporting occurs in African survey research.

Strong tribal sanctions as well as legal restrictions may prevent most individuals from acknowledging their abortions. A 1973 study in rural Ethiopia demonstrated the substantial underreporting that can occur in standard survey research. The women were divided into two groups and asked, either by direct questioning or by the randomized response technique (RRT), if they had ever had induced abortions. Fewer than one percent of the women questioned directly admitted to having had abortions compared with an estimated 34.5 percent of the women interviewed by the RRT (104).

Characteristics of Women Having Abortions

African women tend to turn to abortion early in their reproductive lives. The majority of women hospitalized for abortion complications are under 25 years of age, and, with the exception of those in one study in Ghana (28), unmarried. Their parity is low. In almost every study close to one-third of the women have no children, and very few have more than three. Between 50 and 75 percent of the abortions take place in the first trimester of pregnancy (16, 296, 339, 342, 358, 414). After analyzing 3,182 admissions for abortion complications at Mama Yemo Hospital in Kinshasa, Zaire, Ferdinand Pauls described the typical patient: she is 15 or 16 years old, unmarried, with no previous pregnancies. She is generally a student in her first or second year of secondary school, and her family is economically well off (358).

In many developing countries abortion is most common among older women with several living children, for whom abortion serves as a means of ending childbearing. By contrast, in Africa married and particularly unmarried women rely on abortion to terminate first pregnancies. Moreover, young married women intending to bear more children at a later time use abortion to space their pregnancies (20, 414). This pattern is probably related to socioeconomic changes now underway in most countries in the region — rapid urbanization and increasing education for women — and to the absence of extensive national family planning programs and commercially available contraceptives.

Urbanization, Education, and Fertility Control

Urbanization and the rising costs of living in a money economy have created strong pressures to reduce childbearing (74, 241, 346, 353). The influx of young men and women into the urban areas has resulted in high unemployment and acute overcrowding (267, 495). The average household in urban Africa supports at least two or three relatives from rural areas who are either looking for employment or attending school (267).

Use of modern contraceptives, while higher in urban than in rural areas, is nonetheless slight, largely because of the lack of organized family planning services (72, 353). Moreover, urban life has led to a breakdown in a major traditional form of fertility control, postpartum abstinence (61, 241, 302). In rural Africa the taboo against sexual intercourse during lactation promotes adequate child spacing. Crowded city living (which prevents physical separation of marriage partners), education, and the lack of social support for abstinence have eroded the practice. As a result, women have to find a substitute method of spacing births, and that substitute has often been abortion.

Education as well as urbanization is associated with a desire for smaller families (56, 185). In the past decade the proportion of African women attending school has increased markedly. In Kenya, for example, the percent of females age 5-17 attending primary and secondary schools increased from 20 in 1970 to 64 in 1976. Similar increases are reported in other African countries (500). As more young women are continuing their educations, early marriage and family life are delayed. Educated women marry later and have fewer children in their early reproductive years than women without education (73, 114, 186, 190, 191, 309, 489).

Delaying marriage increases the likelihood of unwanted pregnancies. Since pregnancy is grounds for expulsion from most African schools, many young women resort to abortion so that their educations will not be cut short (14, 16, 20, 55, 451, 492). A 1968 survey found that, among 45 Nigerian schools in operation for five years or more, only 12 had witnessed no student expulsions or withdrawals as a result of unwanted pregnancies or deaths from abortion. One school had recorded three deaths in eight years (14).

School girls have little access to effective contraception and often cannot afford safe abortions. In Ghana, for example, the family planning program is directed solely to married women (55, 493); in Tanzania physicians are not permitted to prescribe contraceptives for the unmarried (434). The cost of a safe abortion is high. In Dar es Salaam, Tanzania, for example, the price of a medical abortion in a private hospital is $150 or $200 (US) (434).

Unable to obtain safe abortions, students resort to nonmedical personnel and traditional abortifacients, and the complication rates are high. Often the abortions are performed in the second trimester of pregnancy, leading to more frequent and more serious complications. The delay occurs partly because it is difficult to find a willing provider and partly because traditional methods are less successful at earlier stages of pregnancy (284). In Kampala Hospital, Uganda, in 1973-74 over one-third of the students admitted for abortion complications had had their abortions induced by untrained abortionists (266). In Lagos University Teaching Hospital, Nigeria, there were 22 cases of postabortion tetanus admitted between 1964 and 1966; 15 of the women were young and unmarried (17). Tetanus often results from the use of nonsterile instruments to induce abortion.

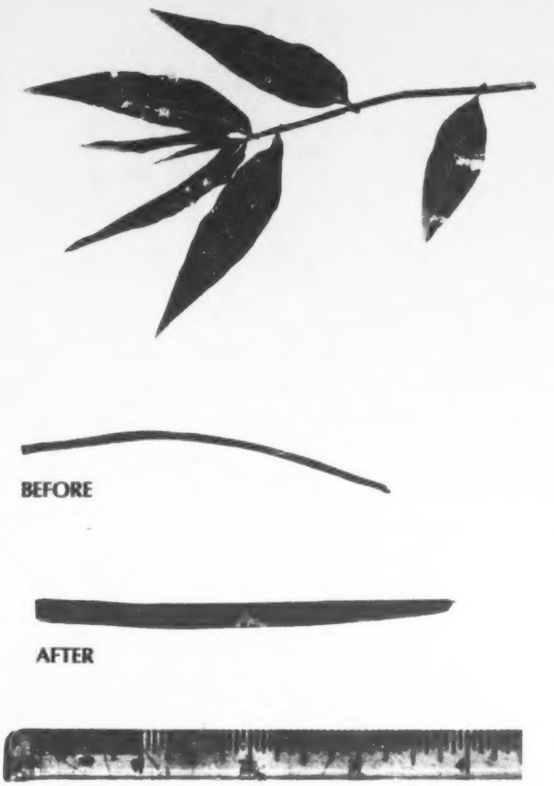
Pregnancy is grounds for dismissal from most African schools. Because contraception is seldom available to unmarried women, many girls will resort to abortion in order to stay in school. (USAID)

Abortion in Rural Areas

While changes in African life and the associated increases in abortion have been most obvious in urban areas, abortion is not strictly an urban phenomenon. Induced abortion is a traditional form of birth control in many parts of Africa (326). Abortion was most often used when a woman broke the lactation taboo and became pregnant while nursing. Closely spaced pregnancies led to strong social condemnation of both partners, but especially of the women. In some areas in Zaire, for example, special songs of contempt accompanied by descriptive gestures and laughter were sung at the woman (520). Women in Benin (423), Nigeria (8), Tanzania (382), Zaire (520), and Zambia (457) are reported to have relied on abortion to avoid the social consequences of unwanted pregnancies.

In some African tribes abortion also was practiced to terminate premarital or extramarital pregnancies (61, 382). For example, among the Meru in Central Kenya, illegitimate children were not accepted in the society, and uncircumcised women were expected to refrain from sexual activity. If a mother discovered that her uncircumcised daughter was pregnant, she called the *aruti ba mau*, who applied pressure to the abdomen until the fetus was expelled (312).

A survey conducted in the southeastern region of Ghana in the early 1970s provides persuasive evidence that abortion is not



The dried stems of the commelina plant are used as cervical dilators in Ghana. The twig, shown before and after insertion into the cervix, absorbs fluid and swells, dilating the cervix and inducing abortion. (Ghana Medical School, courtesy of D.A. Ampofo)

uncommon outside major urban centers (56). In interviews of over 300 women and men living in a town of 4,000 inhabitants, 150 respondents described 53 different abortifacients and abortion techniques. While most methods described would be for self-induced abortion, at least seven abortion providers in the community were mentioned. In autobiographical essays written by middle and secondary school students, pregnancy and abortion were commonly reported. The incidence of induced abortion in one family lineage studied was believed to be as high as 53 abortions per 100 ever-pregnant women (56).

ABORTION IN LATIN AMERICA

Abortion legislation in Latin America is very restrictive. In 10 countries—Chile, Colombia, the Dominican Republic, Guatemala, Haiti, Nicaragua, Panama, Paraguay, Peru, and Venezuela—abortion is prohibited under any circumstances or allowed only if the woman's life is endangered by pregnancy. Four countries—Brazil, Ecuador, Mexico, and Uruguay—permit abortion to save a woman's life and in cases of incest. El Salvador recognizes possible fetal deformity as legal grounds for abortion as well (212, 589).

Less restrictive legislation, which permits abortion when the woman's physical health is threatened by pregnancy, is in force in six countries, including Bolivia and Costa Rica (589).

In Uruguay, legal penalties may be waived because of economic hardship if a woman has an abortion in the first three months of pregnancy (212). Despite the severe restrictions in most countries, criminal prosecutions are few. Generally, investigations are begun only when a woman has died from an illegal abortion (212, 514).

In Cuba the Penal Code of November 1979 legalized abortion on request. In practice, however, since 1965 abortion has been available for all women in the first 10 weeks of pregnancy, and the new law reflects this practice. Harsh penalties are established for illegal abortion — defined as abortion performed for profit, outside hospitals, or without permission of the woman (196).

The incidence of illegal abortion is believed to be very high in Latin America. The International Planned Parenthood Federation estimated in 1974 that approximately 5 million abortions were performed annually in Latin America, corresponding to an abortion rate of 65 per 1,000 women of reproductive age and an abortion ratio of 500 per 1,000 live births (211, 483). These figures on illegal abortion are comparable to the abortion rates and ratios in Cuba, the only country in the region where abortion, although technically illegal until 1979, has been openly provided in hospitals and where official statistics record the annual incidence. In 1977 Cuba reported an abortion rate of 55.9 per 1,000 women and a ratio of 724 abortions per 1,000 live births (482).

Survey research in Latin American countries since the early 1960s documents a high prevalence of illegal abortion (see Table 18) despite the restrictive laws and the opposition of the Roman Catholic Church to abortion. The proportion of survey respondents acknowledging one or more induced abortions in their lifetimes ranges from 9.2 percent in Brazil to 30.7 percent in Mexico (204, 393). The proportion of pregnancies ending in induced abortion may be as low as 5 percent, reported in a 1966 Brazilian study (287), or as high as 33.6 percent, reported in a 1967-1970 prospective survey of women in Santiago, Chile (422).

In addition, a series of epidemiological studies on fertility and abortion conducted by the Latin American Demographic Center (CELADE), showed that the incidence of abortion increased in the 1960s in major Latin American cities (157, 158, 159). In at least one country — Chile — illegal abortion and its complications apparently are decreasing as the national family planning program grows (345).

Chile

When Chile's family planning program was established in 1963, reducing maternal mortality and morbidity from illegal abortion was one of the major objectives (151, 167, 545). Survey research around that time indicated that as many as one of every four women in Chile had had an illegal abortion. Since 1968, however, decreasing numbers of women have been hospitalized for abortion complications, while rates of contraceptive use have increased and birthrates have declined. These statistics reflect the success of the family planning program in Chile (345).

Survey research in Chile in the 1960s showed a high prevalence of abortion (see Table 18). Between 1962 and 1964 Rolando Armijo and Tegualda Monreal interviewed 3,776 women age 20-45 who lived in Santiago, the Province of Concepción, or the city of Antofagasta. Over 20 percent of the women reported having had one or more induced abortions,

Table 18. Lifetime Prevalence of Abortion and Pregnancy Outcome in Latin America, Selected Surveys, 1965-1980

Country	Ref. No.	Date & Place	Respondents	% Reporting Abortion		Total No. of Induced Abortions	% Pregnancies Ending in Abortion	
				Spontaneous & Induced	Induced Only		Spontaneous & Induced	Induced Only
Brazil	29 316	1978, São Paulo State	2,803 women, 15-49	14.7[a]	NA	NA	10.9	NA
	354	Jan.-Feb. 1968, Pôrto Alegre	197 families	NA	NA	147	22.5	13.6
	287	1967, São Paulo	1,157 married women, 15-49	NA	NA	9[b]	26.1	6.7
		1966, São Paulo	1,391 married women, 15-49	NA	NA	13[c]	15.3	5.0
	150	1967-1970, San José	1,211 sexually active women	NA	25.1	776	27.6	15.0
	48	Aug. 1965-Feb. 1966, São Paulo	2,857 married women, 15-49[d]	NA	10.7	594[e]	17.8	6.1
	204	July-Dec. 1963, Rio de Janeiro	1,734 married women, 20-50	NA	9.2	NA	NA	NA
Chile	420, 422	Oct. 1969-Dec. 1970, Santiago	804 married women, 25-39	56[b]	NA	NA	48.2	33.6
			675 married women, 25-29	52.3[c]	NA	NA	34.3	20.7
	36	1962-1964, Santiago, Antofagasta & Province of Concepción	3,776 women, 20-45, most married	41.3	22.6	2,415	NA	NA
		1962-1964, Santiago	1,890 women, 20-45	46.3	26.2	1,394	NA	NA
	387	Oct. 1962-Sept. 1963, Santiago	580 women of reproductive age, most married	NA	NA	608	34.5	23.2
	518	June 1964-NA, Western Santiago	15,467 women in family planning program	NA	NA	18,554	NA	NA
Colombia	400	1976, national	5,378 ever-married women, 15-49	NA	NA	NA	7.5	NA
	282	1966-1968, 4 areas:	Women of reproductive age:					
		Cali	1,905	NA	NA	181	NA	14.5
		Candelaria	142	NA	NA	7	NA	14.0
		Manizales	1,397	NA	NA	93	NA	16.0
		Popayan	1,001	NA	NA	67	NA	11.6
	138	1969, rural areas	2,736 women, 15-49, one-third unmarried	16.5	NA	NA	7.6	NA
El Salvador	29, 124	1978, national	2,322 women, 15-49	13.3[a]	NA	NA	6.1	NA
		1975, national	2,125 women, 15-44	14.8	NA	NA	NA	NA
Mexico	347	1967-1968, Mexico City	1,753 women, 16-49	26.7	NA	NA	NA	NA
	393	early 1960s, Mexico City	1,000 clients of family planning clinic	NA	30.7	797	NA	13.0
Guatemala	361	1978, national	2,684 women, 15-49	10.6[a]	NA	NA	5.4	NA
Paraguay	29, 31	Mar.-Apr. 1977, national	2,048 women, 15-44	15.3	NA	NA	7.4	NA
Panama	29, 30	1976, national	3,701 married women, 20-44	NA	NA	97	7.1	NA

[a] Percentage of women age 15-44
[b] Prospective study design
[c] Retrospective study design
[d] Once married or having one union only
[e] Includes 40 abortions induced "under medical advice"

and over 10 percent had each had four or more abortions. A similar study conducted by Mariano Requena in Santiago in 1962 and 1963 found that a random sample of 580 women had had a total of 608 induced abortions, or an average of 1.05 abortions per woman (387). A prospective study of 804 women age 25-39 in Santiago showed that about one-third of their 164 pregnancies in 1969 and 1970 ended in induced abortion (422).

The high prevalence of abortion reported in survey research is substantiated by the large number of hospital admissions for abortion complications. Between 1931, when records were first kept, and the 1960s, increasing numbers of women were hospitalized for abortion complications, reaching a high of 62,800 in 1966 (516). After 1966 the number of admissions declined. Data from national health service hospitals, which serve about 95 percent of the population, show that this trend has continued. The number of women with abortion complications admitted to national health service hospitals fell by about 45 percent between 1965 and 1978 (345). Rates of hospitalization, based on the national female population age 15-49, fell at a similar pace (see Figure 4 and also Figure 3, p. F-127).

Rates of hospitalization for abortion complications are higher in urban than in rural areas. In the city of Santiago in 1965, 41.6 women were hospitalized for abortion complications per 1,000 women of fertile age, while in Chile as a whole the rate was 29.8 (516).

In Chile, hospital admissions may represent roughly one-third of all acknowledged illegal abortions. In their 1962 survey, Armijo and Monreal found that 31 percent of the women who admitted having had illegal abortions required subsequent hospitalization (36). In a 1970 survey in northern Santiago, 36 percent of all women admitting abortions required subsequent hospitalization (294).

The rapid increase between 1946 and 1960 in hospital admissions for abortion complications (see Figure 4) may have been related to changes in Chilean socioeconomic conditions: decreased agricultural and mining exports, high unemployment, and increased rural-to-urban migration, creating strong pressure to limit family size (294). The decrease in admissions in the 1960s and 1970s has been attributed to the intensive family planning programs begun in the mid-1960s (141, 208, 294, 345, 421, 517, 519). Tegualda Monreal theorizes that, in addition to increased use of contraception, abortions were increasingly performed by physicians and paramedical personnel, rather than by untrained personnel, leading to fewer and less severe complications and thus fewer hospitalizations (294).

The combination of increased contraceptive use and, possibly, more use of skilled abortion providers caused a dramatic decline in abortion morbidity and mortality. Between 1964 and 1979 mortality from abortion fell from 11.8 to 2.4 deaths per 10,000 live births, a decline made even more impressive by the fact that birthrates declined sharply in that period (345, 556). (see Figure 3, p. F-127). In 1964 abortion cases constituted over 20 percent of all obstetrical admissions. by 1978 the proportion had dropped to 13 percent (345). This reduction in abortion admissions eased pressure on obstetrical and gynecological service staff and facilities.

Brazil

Estimates of the annual number of illegal abortions in Brazil in the early 1970s range from 600,000 (300) to 3,000,000 (398). Most research has been confined to urban areas, and, as the range of the estimates suggests, the information from the studies is not always comparable (419). Results of seven surveys of Brazilian women are summarized in Table 18; between 9 and 25 percent of respondents acknowledged one or more induced abortions. Between 5 and 15 percent of all pregnancies ended in induced abortion.

A 1978 survey of 2,800 women from São Paulo State showed that almost 15 percent of all respondents had had a spontaneous or induced abortion (see Table 18). The reported level of induced abortions was twice as high among women in urban areas as among women in the rural areas. In the municipality of São Paulo, 16 percent of the abortions were reported as induced compared with 13.5 percent in other urban areas and 7 percent in rural areas (316).

Admissions records from Brazilian hospitals indicate that women with complications of spontaneous or illegal abortion constitute a substantial proportion of all patients. Of 1,697 women admitted to a maternity hospital in Salvador, Bahia, during 3 months in 1970, 21 percent were treated for abortion complications (84). In 46 Brazilian hospitals in 1964, 233 women were treated for abortion complications for every 1,000 deliveries (399). A São Paulo hospital that admitted 5,500 women for complications of pregnancy and childbirth between 1944 and 1962 treated one-third of them for abortion complications (327).

Colombia

Three national and regional surveys conducted since 1965 report a wide range of abortion rates and ratios in Colombia. The surveys show that between 7 and 16 percent of reported pregnancies ended in spontaneous or induced abortions (138, 282, 400). (see Table 18). It has been estimated, however, that between 200,000 and 250,000 illegal abortions occur annually in Colombia, or about 286 abortions per 1,000 live births (209, 490).

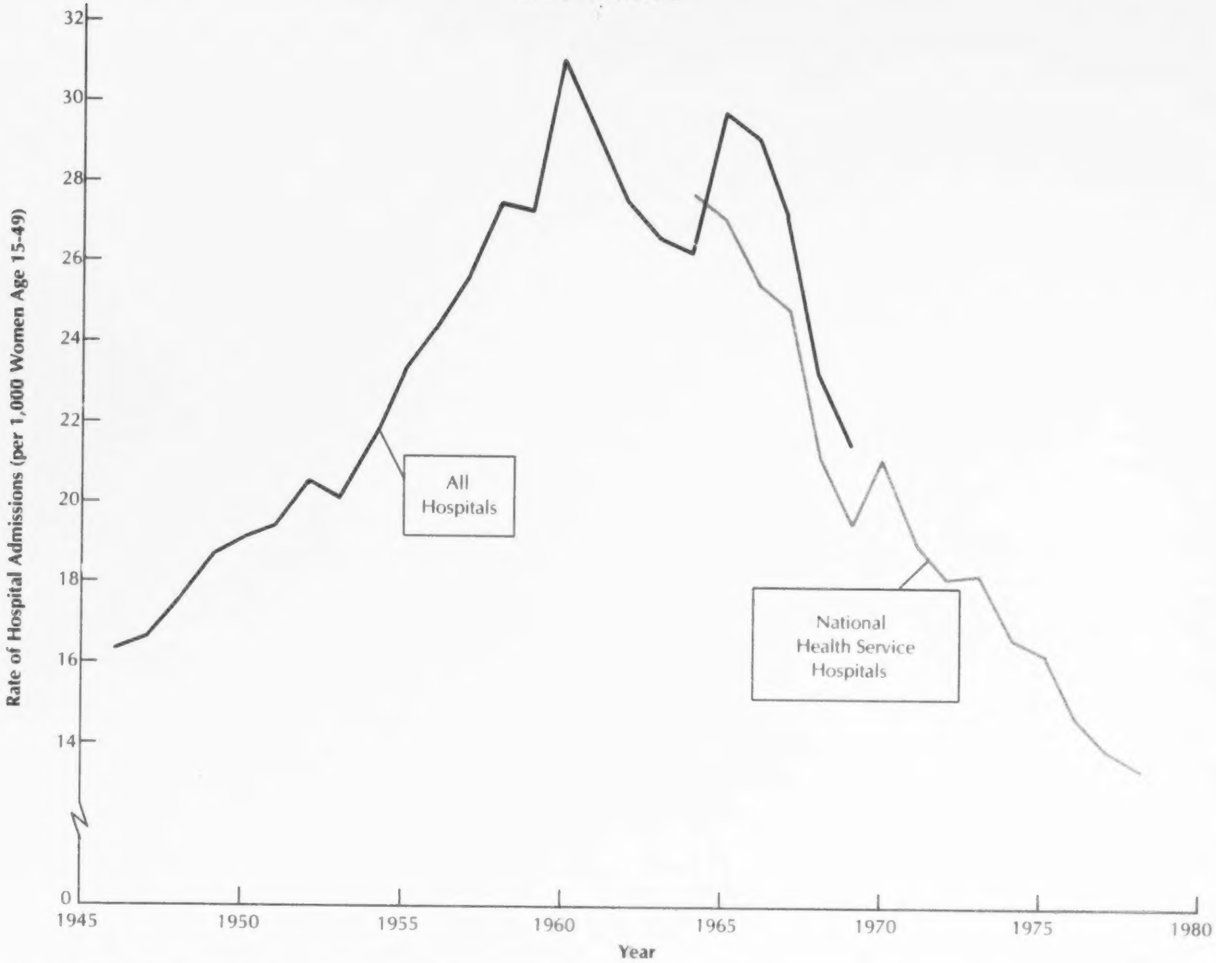
The highest abortion rates were reported in a 1964 survey of three cities and one rural area — between 570 and 960 abortions per 1,000 women interviewed. By contrast, the Colombian rural fertility survey of 1969 reported a lifetime incidence of only 288 abortions per 1,000 women interviewed and the World Fertility Survey in 1976 found 221 abortions per 1,000 women interviewed (138, 400). This difference may represent a decline in abortion or simply a variation in survey responses.

Hospital admissions records dating back to the 1960s indicate that women with abortion complications occupied many hospital beds in Colombian cities. From 1965 through the first eight months of 1969, the Maternal and Child Institute in Bogotá recorded 25,569 admissions for abortion complications. Between 77 and 87 percent of the abortions were believed to have been induced (417). From 1970 through 1978 the same hospital reported 54,705 admissions for abortion complications — 18 percent of all hospital admissions. Deaths from septic abortion alone during this period accounted for 40 percent of the maternal mortality occurring in this hospital (572). The University Hospital in Caldas treated 1,229 abortion complication cases between 1966 and 1968 — 186 abortions per 1,000 births, or about one abortion case for every five births (512). A similar ratio, 215 abortions per 1,000 births, was recorded at University Hospital of Barranquilla. Between 1969 and 1971, 4,106 abortion complication cases were admitted; 33 percent of the abortions were induced (130).

El Salvador

Illegal abortion is a significant cause of maternal mortality in El Salvador. In 1973 and 1974, at least 11 percent of maternal

Figure 4. Rates of Hospital Admissions for Abortion Complications, Chile, 1946-1978



Note: Rates for national health service hospitals based on national population of women age 15-49; thus rates shown underestimate actual rate. Population data from United Nations (497-499, 592-595), United States (503).

Source: Onetto (345), Viel (516)

deaths were due to complications of abortion (307). The actual prevalence of abortion and of induced abortion specifically are still unknown, but contraceptive prevalence surveys conducted in 1975 and 1978 indicate that one of every seven women age 15-44 has had a spontaneous or induced abortion at some time in her life. Among currently married women age 15-44, as many as one of every five has had one or more abortions (124, 307) (see Table 19).

Compared with Chile, the rate of hospitalization for abortion complications in El Salvador in the last two decades is low. Between 1964 and 1973, rates ranged from 9.9 to 12 per 1,000 women age 15-49, less than half the Chilean rates for the same period. The El Salvador rates remained fairly stable between 1964 and 1973. The proportion of abortions classified as septic has increased, however. In Maternity Hospital in San Salvador in 1968 one of every five hospitalized abortions was septic; in 1972, one of every four (308).

Panama

As in Colombia, the Panama World Fertility Survey, conducted in 1976, found relatively few women reporting abortions. Only 7.1 percent of all pregnancies were said to terminate in spontaneous or induced abortion (30) (see Table 18). Hospital records and death certificates, however, suggest that abortion is actually more frequent and is an important cause of maternal mortality and morbidity. In the years 1968 to 1973, abortion complications caused between 6 and 13 percent of the reported maternal deaths in Panama (306). In 1973 Ministry of Health institutions treated 3,207 spontaneous and illegal abortion cases, comprising 9.6 percent of the maternal discharges for that year (306).

Mexico

An estimated 500,000 to 600,000 illegal abortions are performed annually in Mexico, for a national rate of about 48 abortions per 1,000 women age 15-44 (7, 152, 498). As many as one of every four or five pregnancies ends in illegal abortion. Since 1973, when the national family planning program began, contraceptive usage has increased and the birthrate has declined. While some evidence is conflicting, records from the Mexican Social Security Institute suggest that the increasing use of contraception may have led to lower rates of abortion.

Hospital admissions records and surveys of women (see Table 18) from the 1960s and early 1970s document a high prevalence of illegal abortions. In the early 1960s interviews with

1,000 randomly selected clients at a family planning clinic in Mexico City revealed that almost one-third had had one or more abortions (393). In a 1967-1968 survey of Mexico City women randomly selected from a household census, one of every four women reported a spontaneous or induced abortion. When only those women who had ever been pregnant were considered, one of every three had had a spontaneous or induced abortion (347).

In Mexico City rates of hospitalization for abortion complications have been high. In a 5-year period in the 1960s three large Mexican Social Security Institute maternity hospitals treated 61,964 cases of abortion complications, for an average of 12,393 annually, approximately 14 percent of the hospitals' annual caseloads. This figure represents a rate of 44 hospitalizations per 1,000 women age 15-44 in the entire female population covered by the Mexico Social Security Institute in Mexico City (347). This rate is much higher than the national rates reported for Chile and El Salvador but is comparable to the rates for Santiago (516). In 1970, 119,000 women with abortion complications were treated in Mexican hospitals (7).

In Mexico, as in other Latin American countries, a national family planning program led to increased use of contraception and a decline in the birthrate. In December 1973 only 11 to 12 percent of women of reproductive age in union were users of contraception; by June 1976 the proportion had increased to 21 percent (152). This growing use of contraception contributed to a decline in the total fertility rate from 6.54 in 1970 to 5.18 in 1978 (504). Whether increased contraceptive use has caused a decline in the incidence of abortion is uncertain. According to one source the rate of hospital admissions for abortion complications per 1,000 women enrolled in health care programs of the Mexican Social Security Institute (IMSS) and Institute of Social Security for Government Workers (ISSTE) dropped from 43.9 to 21.6, a decline of 51 percent (272). Among women covered by ISSTE, the ratio of hospitalized abortion cases per 1,000 births dropped from 380 in 1972 to 190 in 1978 (205). Reports from the Social Security Institute for the State of Mexico also suggest a decline in the incidence of abortion. Between 1972 and 1979 the hospitalized abortion rate per 1,000 women of fertile age registered with a family physician fell from about 45 to 15. At the same time, the number of births per 1,000 women also declined from 228 to 165 and the percentage of women using contraception increased from 6.3 to 13.1 (257). Records from a major IMSS hospital in Mexico City from 1970 to 1978, however, show a 131 percent increase in admissions for abortion complications from 2,559 to 5,915. In 1978 the hospital treated 355 abortion cases for every 1,000 live births (547). These records indicate that illegal abortion remains a major public health problem in urban Mexico whether or not national or regional rates have declined.

Table 19. Percentage of Currently Married Women Age 15-44 Reporting History of Spontaneous or Induced Abortion, by Residence, Four Latin American Areas, 1975-1978

Country & Date	Ref. No.	No. of Women	% Reporting History of Abortion			
				Residence		
			All Women	Metropolitan	Other Urban	Rural
El Salvador 1975	307	631	24.6	19.8	20.1	27.4
1978	124	1,476	19.9	18.8	16.2	21.6
Guatemala 1978	361	2,684	20.4			16[a] 6.8[b]
Brazil 1978 São Paulo State	316	1,880	21.9	24.3	20.1	22.4
Paraguay 1977	31	1,233	24	37.5	18.4	21.7

[a] Rural Latin population

[b] Rural indigenous population

Characteristics of Women Having Abortions

In Latin America, as in Asia and the Middle East, abortion is most frequent among older, married, urban women with several living children, and possibly among women of the middle socioeconomic and educational classes. New research, however, indicates that some of these patterns may be changing.

While most women who report abortion are legally married or living in consensual unions, abortion among unmarried women is not rare and may be increasing. Reports from 39 hospitals in nine Latin American countries collected by the International Fertility Research Program (IFRP) show that single women constituted 18 percent of the almost 28,000 women treated for abortion complications between 1974 and 1979 (206). According to surveys in five cities conducted by the Latin American Demographic Center (CELADE) between 1968 and 1971, when single women become pregnant, they are more likely than married women to obtain abortions (157, 158, 159).

In Latin America women used to rely on abortion mainly to terminate childbearing. The CELADE surveys in Bogotá, Lima, Asunción, and Buenos Aires showed that the rate of abortion rose with both parity and age (157, 158, 159). Generally, abortion increased markedly after women had reached a certain level of parity, and this level seemed to reflect the desired family size in the country (158). For example, in Buenos Aires women with two children reported 39.6 abortions per 1,000 women in their lifetimes, while women with three children reported 93.5 per 1,000. In Panama City and Lima large increases in abortion rates occur after the fourth child (157, 158, 159).

The IFRP hospital study presents evidence that growing proportions of women are now using abortion to space births or postpone childbearing. The majority of the women hospitalized for abortion complications were between 25 and 29 years of age and almost 25 percent had no living children. Thus, the women in this study were younger and of lower parity than women in studies conducted in the 1960s (206).

Several Latin American studies indicate that women who have already had one induced abortion tend to have another when faced with additional unwanted pregnancies (515). In three Mexico City hospitals, for example, 3,714 women treated for abortion complications reported a total of 11,398 induced abortions, or 3 abortions per woman (347). In a survey of Chilean women in 1962-1964, 885 women admitted to 2,415 induced abortions, or 2.7 abortions per woman (34). Similar results from other studies indicate that repeat abortions are not uncommon (48, 376, 385, 386, 422).

Hospital admissions records suggest that abortion is more frequent among urban women than rural (308, 386, 516). This difference, however, may be partially due to greater availability and use of health care facilities by women in urban areas. In recent fertility surveys of currently married women in El Salvador, São Paulo State in Brazil, Guatemala, and Paraguay, abortion rates are higher in the urban area of only one country, Paraguay. Except in Brazil, women in urban areas were more likely to be hospitalized after their last abortion than women in rural areas. In the 1978 El Salvador survey, for example, 68 percent of urban women reporting abortions were hospitalized after their last abortion compared with 27 percent of the rural women (124) (see Table 19).

Early research on the association between socioeconomic status and abortion suggested that abortion was most frequent at the middle socioeconomic levels of society and least frequent at the extreme upper and lower levels. More recent research, however, fails to reveal any consistent relationship. Using education as a measure of social class, Mariano Requena cites studies in the 1960s in Mexico City, Santiago, and Bogotá showing a greater prevalence of induced abortion among women with primary school education than among women with no education or women with secondary or university education (386).

Research conducted in the late 1960s and 1970s no longer shows this pattern. The CELADE survey, for example, found differing relationships between abortion and education among the cities surveyed. In Bogotá, Lima, Panama City, and Asunción, lifetime abortion rates decreased as education increased. In Buenos Aires, however, the highest rate of abortion was among university educated women (157, 158, 159). Other survey research documents wide differences in relationships between abortion and education among Latin American countries. In Santiago and El Salvador, abortion was most common among women with three years of education or less (124, 422), whereas in Paraguay abortion was most common among women with more than six years of education (31). Thus, in Latin America, other factors — such as the desire to control fertility and the availability of contraception — may have more impact on abortion prevalence than education.

Overall, throughout the developing world, abortion seems to be increasing except where family planning programs have been specifically designed, as in Chile, to substitute family planning for abortion. Mortality from abortion is markedly lower (1) where contraception is used instead of abortion; (2) where legal restrictions on abortion have been lifted and legal abortion procedures are readily available; (3) where physicians or other medically trained practitioners perform the procedure using sterile dilatation and curettage or vacuum aspiration techniques; and (4) where good clinical management of abortion complications is easily accessible. Nevertheless, in many parts of the world, these conditions do not prevail, and mortality from illegally induced abortion is high — as many as one out of every 3 or 4 maternal deaths may be due to illegal abortion. Other health problems among women of reproductive age — including infertility — can be attributed to complications of illegal abortion. As more women and couples decide to have fewer children and as more public and private agencies try to develop improved family health programs, the individual health hazards of illegal abortion and the public health costs of treating the ensuing complications will remain a serious problem in many countries.

BIBLIOGRAPHY

Asterisk (*) designates an article that was of particular value in the preparation of this issue of **Population Reports.**

1. ANONYMOUS. Across the border for abortion — to China. Intercom 6(12): 5. December 1978.

2. ANONYMOUS. Contraceptive use before and after abortion. Kingston, Jamaica, Queens University, April 1974. 7 p. (Mimeo)

3. ANONYMOUS. La prévention des naissances et le personnel de santé tunisien. [Birth prevention and the Tunisian health professions.] [FR] Population 33(3): 736-737. May-June 1978.

4. ANONYMOUS. Nearly 50,000 deliveries a year! A close look at Caracas' Conception Palacio maternity hospital: the facts behind the figures. Contemporary Ob/Gyn 3(6): 68-91. June 1974.

5. ANONYMOUS. The results of abortion methods and future contraceptive practices of patients undergoing therapeutic abortion. [Singapore, Kandang-Kerbau Hospital], [1972]. 15 p. (Unpublished)

6. ABERNATHY, J.R., GREENBERG, B.G., and HORVITZ, D.G. Estimates of induced abortion in urban North Carolina. Demography 7(1): 19-29. February 1979.

7. ACOSTA, M., BOTTON-BURLA, F., DOMINGUEZ, L., MOLINA, I., NOVELO, A., and NÚÑEZ, K. El aborto en Mexico. [Abortion in Mexico.] [SP] Mexico City, Mexico, Fondo de Cultura Economica, 1976. (Archivo del Fondo No. 57) 81 p.

8. ACSÁDI, G.T. Traditional birth control methods in Yorubaland. In: Marshall, J.F. and Polgar, S., eds. Culture, natality and family planning. Chapel Hill, North Carolina, Carolina Population Center, 1976. (Carolina Population Center Monograph No. 21) p. 126-155.

9. ADADEVOH, B.K. Sub-fertility and infertility in Africa. In: Sai, F.T., ed. Family welfare and development in Africa. (Proceedings of the IPPF Regional Conference, Ibadan, Nigeria, August 29-September 3, 1976) London, International Planned Parenthood Federation, 1977. p. 80-84.

10. ADADEVOH, B.K. and AKINLA, O. Postabortal and postpartum tetanus. Journal of Obstetrics and Gynaecology of the British Commonwealth 77: 1019-1023. November 1970.

11. ADEY, E.M. Population control in China. British Medical Journal 2(5918): 548-550. June 8, 1974.

12. AKHTER, N. Pregnancy and abortion in adolescence. Presented at the World Health Organization Meeting on Pregnancy and Abortion in Adolescence, Geneva. June 24-28, 1974. 8 p.

13. AKINGBA, J.B. Abortion, maternity and other health problems in Nigeria. Nigerian Medical Journal 7(4): 465-471. October 1977.

14. AKINGBA, J.B. The problem of unwanted pregnancies in Nigeria today. Lagos, Nigeria, University of Lagos Press, [1972]. 133 p.

15. AKINGBA, J.B. and GBAJUMO, S.A. Procured abortion: counting the cost. Journal of the Nigeria Medical Association 7(2): 17-28. April 1970.

16. AKINLA, O. Abortion in Africa. In: Hall, R.E., ed. Abortion in a changing world. Vol. 1. (Proceedings of an International Conference, Hot Springs, Virginia, November 17-20, 1968) New York, Columbia University Press, 1970. p. 291-301.

17. AKINLA, O. The problem of abortion in Lagos. In: Israel Academy of Sciences and Humanities. Proceedings of the 6th World Congress on Fertility and Sterility, Tel Aviv, May 20-27, 1968. Jerusalem, Israel, Israel Academy of Sciences and Humanities, 1970. p. 113-120.

18. ALAVI-NAINI, M. The incidence of induced and spontaneous abortion among high socioeconomic classes in Iran. In: Nazer, I.R., ed. Induced abortion: a hazard to public health? (Proceedings of the 1st Conference of the IPPF Middle East and North Africa Region, Beirut, Lebanon, February 1971) Beirut, Lebanon, International Planned Parenthood Federation, 1972. p. 182-190.

19. ALI, M.W. [Benadir Teaching Hospital, Mogadishu, Somalia] [Incidence of hospitalized treatment for abortion complications] Personal communication, March 26, 1980. 3 p.

20. ALIHONOU, E. [Université Nationale du Benin] [Illegal abortion in Benin] Personal communication, May 22, 1980.

21. ALTEMEIER, W.A. Steroids in septic shock. Antibiotics and Chemotherapy 21: 201-203. 1976.

22. AMPOFO, D.A. Abortion in Accra: the social, demographic and medical perspectives. In: Addo, N.O., Ampofo, D.A., Benneh, G., Gaisie, S.K., and Kpedekpo, G.M.K., eds. Symposium on Implications of Population Trends for Policy Measures in West Africa. Legon, Ghana, University of Ghana Demographic Unit, 1970. (Ghana Population Studies No. 3) p. 79-105.

23. AMPOFO, D.A. Causes of maternal death and comments, Maternity Hospital, Accra, 1963-1967. West African Medical Journal 18(3): 75-81. June 1969.

24. AMPOFO, D.A. The dynamics of induced abortion and the social implication for Ghana. Ghana Medical Journal 9(4): 295-302. December 1970.

*25. AMPOFO, D.A. Epidemiology of abortion in selected African countries. Presented at the International Planned Parenthood Federation Conference on the Medical and Social Aspects of Abortion in Africa, Accra, Ghana, December 12-18, 1973. 22 p.

26. AMPOFO, D.A. [University of Ghana Medical School] [Non-medical abortion methods in Ghana] Personal communication, December 3, 1979. 1 p.

27. AMPOFO, D.A. Socio-cultural and medical perspectives of infertility in Ghana: epidemiological characteristics of 202 cases. In: Sai, F.T., ed. Family welfare and development in Africa. (Proceedings of the IPPF Regional Conference, Ibadan, Nigeria, August 29-September 3, 1976) London, International Planned Parenthood Federation, 1977. p. 96-102.

28. AMPOFO, D.A. 330 cases of abortion treated at Korle Bu Hospital: the epidemiological and medical characteristics. Ghana Medical Journal 9(3): 156-162. September 1970.

29. ANDERSON, J.E. [U.S. Center for Disease Control] [Abortion data from Latin America] Personal communication, June 3, 1980.

30. ANDERSON, J.E. Reported incidence of abortion in world fertility surveys and contraceptive prevalence surveys. Atlanta, Georgia, Center for Disease Control, Bureau of Epidemiology, September 1979. (Working Paper) 10 p.

31. ANDERSON, J.E., MORRIS, L., and MONTEITH, R. Contraceptive prevalence in Paraguay: major findings and results from a 1977 survey: analytical report (revised May 1978). Atlanta, Georgia, Center for Disease Control, 1978. 55 p. (Mimeo)

32. ANDOLŠEK, L. Experience with immediate post-abortion insertions of the IUD. In: Lewit, S., ed. Abortion techniques and services: proceedings of the conference, New York, June 3-5, 1971. Amsterdam, Netherlands, Excerpta Medica, 1972. p. 63-67.

33. ANDOLŠEK, L. Sequelae of abortion. In: Diczfalusy, E., ed. Regulation of human fertility. (Proceedings of the WHO Symposium on Advances in Fertility Regulation, Moscow, USSR, November 16-19, 1976) Copenhagen, Denmark, Scriptor, 1977. p. 428-457.

34. ARMIJO, R. and MONREAL, T. Epidemiology of provoked abortion in Santiago, Chile. In: Muramatsu, M. and Harper, P.A., eds. Population dynamics: international action and training programmes. Baltimore, Maryland, Johns Hopkins Press, 1965. p. 137-160.

35. ARMIJO, R. and MONREAL, T. Factors associated with complications following provoked abortion. Journal of Sex Research 4(1): 1-6. 1968.

36. ARMIJO, R. and MONREAL, T. The problem of induced abortion in Chile. Milbank Memorial Fund Quarterly 43(4, Pt. 2): 263-280. October 1965.

37. ASOCIACION COLOMBIANA DE FACULTADES DE MEDICINA [ASCOFAME]. Estudio de aborto hospitalario. [Hospital abortion study.] [SP] [Bogotá], Colombia, ASCOFAME, July 1968-1969.

38. AVELING, J.H. English midwives: their history and prospects. London, Hugh K. Elliott, 1967. 186 p.

39. BACHI, R. Abortion in Israel. In: Hall, R.E., ed. Abortion in a changing world. Vol. 1. (Proceedings of an International Conference, Hot Springs, Virginia, November 17-20, 1968) New York, Columbia University Press, 1970. p. 274-283.

40. BAKARE, C.G.M. Medical and paramedical opinion in Nigeria. In: David, H.P., Friedman, H.L., van der Tak, J., and Sevilla, M.J., eds. Abortion in psychosocial perspective: trends in transnational research. New York, Springer, 1978. (Transnational Family Research Institute) p. 259-283.

41. BARNES, A.B. and ULFELDER, H. Septic abortion. Journal of the American Medical Association 189: 919-923. 1964.

42. BARSY, G. and SARKANY, J. Impact of induced abortions on the birthrate and infant mortality. Demográfia 6: 427. 1963.

43. BATES, J.E. and ZAWADZKI, E.S. Criminal abortion: a study in medical sociology. Springfield, Illinois, Charles C Thomas, 1964. 250 p.

44. BEGUM, F., KHAN, A.R., and JAHAN, S. Experience with abortion related admissions in Dacca Medical College Hospital. Dacca, Bangladesh, Bangladesh Fertility Research Programme, August 1978. (Technical Report No. 8) 14 p.

45. BEHJATNIA, Y. Consultant report: incomplete abortions treated at Jahanshah Saleh Hospital in Tehran, Iran from May 14, 1973 to April 30, 1974. Acta Medica Iranica 21(1): 53-67. 1978.

46. BEN CHEIKH, T. and LARIBI, M. The Tunisian experience of induced abortion. In: Nazer, I.R., ed. Induced abortion: a hazard to public health? (Proceedings of the 1st Conference of the IPPF Middle East and North Africa Region, Beirut, Lebanon, February 1971) Beirut, Lebanon, International Planned Parenthood Federation, 1972. p. 286-296.

47. BERNARD, R.P., CHI, I.-C., and MILLER, E. Abortions requiring hospital treatment in four countries in Asia and Africa (4,584 patients in Jakarta, Bangkok, Cairo and Accra, 1971-1974). Presented at the 4th Sudanese Congress of Obstetrics and Gynaecology, Khartoum, Democratic Republic of Sudan, Africa, February 10-13, 1975. 33 p.

48. BERQUO, E.S., MARQUES, R.M., MILANE[illegible] M.L., MARTINS, J.S., PINHO, E., and SIMON, I. Levels and variations in fertility in Sao Paulo. Milbank Memorial Fund Quarterly 46(3, Pt. 2): 167-185. July 1968.

49. BHATT, R.V. [Medical College, Department of Obstetrics and Gynaecology, Baroda, India] [Photographs of instrum[illegible]sed for abortion and left in vaginas] Personal communicat[illegible]ch 15, 1980.

50. BHATT, R.V. [Medical College, Department of Obstetrics and Gynaecology, Baroda, India] [Sticks as instruments of illegal abortions] Personal communication to S. Coleman, June 10, 1978. 1 p.

51. BHATT, R.V. and SONI, J.M. Criminal abortion in western India. Journal of Obstetrics and Gynaecology of India 23(3): 243-246. June 1973.

52. BHUIYAN, N., BEGUM, R., and BEGUM, S. Characteristics of abortion cases admitted in Chittagong Medical College Hospital in 1978. Presented at the Annual Contributors' Conference of Bangladesh Fertility Research Programme, Dacca, November 8, 1979. Dacca, Bangladesh, Bangladesh Fertility Research Programme, November 1979. (Technical Report No. 33) 21 p.

53. BHUIYAN, N. and BEGUM, S. Experience with menstrual regulation and family planning service in Chittagong Medical College Hospital between October 1978 to July 1979. Presented at the Annual Contributors' Conference of Bangladesh Fertility Research Programme, Dacca, November 8, 1979. Dacca, Bangladesh, November 1979. (Technical Report Series No. 32) 8 p.

54. BICKERS, W. Serious complications of induced abortion in Lebanon. In: Nazer, I.R., ed. Induced abortion: a hazard to public health? (Proceedings of the 1st Conference of the IPPF Middle East and North Africa Region, Beirut, Lebanon, February 1971) Beirut, Lebanon, International Planned Parenthood Federation, 1972. p. 102-109.

55. BLEEK, W. Family planning or birth control: the Ghanaian contradiction. Cultures et Developpement 9(1): 64-81. 1977.

56. BLEEK, W. Sexual relationships and birthcontrol in Ghana: a case study of a rural town. Amsterdam, Netherlands, University of Amsterdam, 1976. 352 p.

57. BORIA, M.C. and GORDON, M. Complications from intrauterine devices: postpartum and postabortal insertions. Journal of Reproductive Medicine 14(6): 251-255. June 1975.

58. BOSE, S. Abortions: a clinical review of 1217 cases. Journal of Obstetrics and Gynaecology 10(1): 56-61. September 1959.

59. BOSSEMEYER, R., CHAGAS, C.A., and CARÚS, N.R. Abortamento espontâneo e provocado: estudo epidemiológico. [Spontaneous and induced abortion: an epidemiological study.] [PT] Femina 4(6): 352-356. June 1976.

60. BOTES, M. Septic abortion and septic shock. South African Medical Journal 47(10): 432-435. March 10, 1973.

61. BOUTE, J. Zaire. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 592-609.

62. BOYD, E.F., Jr. and HOLMSTROM, E.G. Ovulation following therapeutic abortion. American Journal of Obstetrics and Gynecology 113(4): 469-473. June 15, 1972.

63. BOYSEN, H. and MCRAE, L.A. Tubal sterilization through the vagina. American Journal of Obstetrics and Gynecology 58(3): 488-493. September 1949.

64. BRACKEN, M.B., GROSSMAN, G., and HACHAMOVITCH, M. Contraceptive practice among New York abortion patients. American Journal of Obstetrics and Gynecology 114(7): 967-977. December 1, 1972.

65. BRENNER, W.E., CHI, I.-C., BERNARD, R.P., and BRINTON, L.A. Abortion in four Asian countries: patient characteristics, morbidity and contraceptive acceptance. Journal of Asian Federation of Obstetrics and Gynaecology 4(2): 53-70. December 1973.

66. BROWNER, C. Preliminary data report. The management of early pregnancy: folk concepts of fertility control in Cali, Colombia. Detroit, Michigan, Wayne State University, Department of Anthropology, [1976]. 14 p.

67. BURKMAN, R.T., TONASCIA, J.A., ATIENZA, M.F., and KING, T.M. The relationship of immediate post-abortal intrauterine device insertion to subsequent endometritis: a case-control study. Contraception 15(4): 435-444. April 1977.

68. BURNHILL, M.S. Reducing complications of first-trimester abortion. Contemporary Ob/Gyn 13(5): 145-166. May 1979.

69. CABRERA P., R. Aplicación postaborto del D.I.U. Saf-T-Coil 33 S. [Postabortion insertion of the I.U.D. Saf-T-Coil 33 S.] [SP] Revista Chilena de Obstetricia y Ginecologia 33: 215-220. 1969.

70. CABRERA P., R. and DELGADO, G. In-hospital contraceptive program. [EN, SP] In: Sanhueza, H. and [illegible]mes, E., eds. Contraceptive progress in Latin America and the Caribbean. (Proceedings of the IPPF/WHO 2nd Regional Medical Seminar, Medellin, Colombia, November 25-26, 1975) New York, International Planned Parenthood Federation, 1976. p. 212-222.

71. CAILLOUETTE, J.C. Septic abortion: current management. [Letter] California Medicine 113(6): 44. December 1970.

72. CALDWELL, J.C. Fertility control. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 58-97.

*73. CALDWELL, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. 763 p.

74. CALDWELL, J.C. The study of fertility and fertility change in tropical Africa. Voorburg, Netherlands, International Statistical Institute, May 1974. (World Fertility Survey Occasional Papers No. 7) 35 p.

75. CALDWELL, J.C. and IGUN, A. The spread of anti-natal knowledge and practice in Nigeria. Population Studies 24(1): 21-34. March 1970.

76. CALDWELL, J.C. and THOMPSON, B. Gambia. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 493-526.

77. CALDWELL, P. Egypt and the Arabic and Islamic worlds. In: Caldwell, J.C., ed. The persistence of high fertility: population prospects in the third world. Vol 1, Pt. 2. Canberra, Australia, Australian National University, 1977. (Family and Fertility Change; Changing African Family Companion Series No. 1) p. 593-616.

78. CARRINGTON, E.R. Endotoxic shock in the obstetric patient. Journal of the Kentucky Medical Association 63(8): 567-570. August 1965.

79. CARRIZOSA, J. Gram-negative sepsis. Journal of the American Medical Women's Association 31(9): 354-362. September 1976.

80. CATES, W., Jr. Late effects of induced abortion: hypothesis or knowledge? Journal of Reproductive Medicine 22(4): 207-212. April 1979.

81. CATES, W., Jr., GRIMES, D.A., SMITH, J.C., and TYLER, C.W., Jr. Legal abortion mortality in the United States: epidemiologic surveillance, 1972-74. Journal of the American Medical Association 237(5): 452-455. January 31, 1977.

82. CATES, W., Jr. and ROCHAT, R.W. Illegal abortions in the United States: 1972-1974. Family Planning Perspectives 8(2): 86-90. March-April 1976.

83. CATES, W., Jr. and TIETZE, C. Standardized mortality rates associated with legal abortion: United States, 1972-1975. Family Planning Perspectives 10(2): 109-112. March-April 1978.

84. CAVALCANTE FARIAS, F. Condicionamentos sócioeconômicos do abortamento provocado. [Socioeconomic conditions of induced abortion.] [PT] Revista Paulista de Hospitais 10(2): 25-31. February 1972.

*85. CAVANAGH, D. and COMAS, M.R. Identification and importance of the problem. In: Cavanagh, D., Rao, P.S., and Comas, M.R. Septic shock in obstetrics and gynecology. Philadelphia, Pennsylvania, W.B. Saunders, 1977. (Major Problems in Obstetrics and Gynecology, Vol. 11) p. 1-4.

*86. CAVANAGH, D. and COMAS, M.R. Management of the patient in septic shock. In: Cavanagh, D., Rao, P.S., and Comas, M.R. Septic shock in obstetrics and gynecology. Philadelphia, Pennsylvania, W.B. Saunders, 1977. (Major Problems in Obstetrics and Gynecology, Vol. 11) p. 94-108.

87. CAVANAGH, D. and COMAS, M.R. Spontaneous abortion. In: Danforth, D.N., ed. Obstetrics and gynecology. 3rd ed. Hagerstown, Maryland, Harper and Row, 1977. p. 320-336.

88. CAVANAGH, D. and RAO, P.S. Septic shock (endotoxic shock). Clinical Obstetrics and Gynecology 16(2): 25-39. June 1973.

89. CAVANAGH, D., SINGH, K.B., OSTAPOWICZ, F., WOODS, R.E., and DECENZO, J.A. Septic abortion with endotoxic shock. Australian and New Zealand Journal of Obstetrics and Gynaecology 10(2): 160-166. May 1970.

90. CENTRO LATINOAMERICANO DE DEMOGRAFIA [CELADE]. Aborto en America Latina: situación en algunas capitales Latino Americanas según encuestas del Centro Latinoamericano de Demografía. [Abortion in Latin America: situation in each Latin American capital derived from surveys of the Latin American Center of Demography.] [SP] Santiago, Chile, CELADE, 1975. p. 538-549.

91. CHAMBERLAIN, G. Safety of post-abortion sterilisation. [Letter] Lancet 2(8150): 1020. November 10, 1979.

92. CHANDRASEKHAR, S. Population and law in India. 2nd ed. Delhi, Macmillan Company of India, 1978. [Center for Population Studies Occasional Paper No. 1) 157 p.

93. CHANII, A.G. [Bugando Hospital, Mwanza, Tanzania] [Abortion incidence and treatment] Personal communication, November 9, 1979. 2 p.

94. CHATTERJEE, P. Induced abortion and its hazards. Journal of the Indian Medical Association 69(8): 173-175. October 16, 1977.

95. CHEN, L.C., GESCHE, M.C., AHMED, S., CHOWDHURY, A.I., and MOSLEY, W.H. Maternal mortality in rural Bangladesh. Studies in Family Planning 5(11): 334-341. November 1974.

96. CHEN, P.-C. [Wayne State University] [Population policies in China] Personal communication, September 27, 1979.

*97. CHENG, M.C.E., CHEW, S.C., CHEONG, I., CHOO, H.T., RATNAM, S.S., BELSEY, M.A., and EDSTROM, K.E. Safety of postabortion sterilisation compared with interval sterilisation: a controlled study. Lancet 2(8144): 682-685. September 29, 1979.

98. CHENG, M.C.E. and ROCHAT, R.W. The safety of combined abortion-sterilization procedure. American Journal of Obstetrics and Gynecology 129(5): 548-552. November 1, 1977.

99. CHI, I.-C., BERNARD, R.P., AMPOFO, D.A., and KOETSAWANG, S. Incomplete abortions in Accra and Bangkok University hospitals 1972-1973. International Journal of Gynaecology and Obstetrics 13: 148-161. 1975.

100. CHI, I.-C., CHOW, L.P., and RIDER, R.V. The randomized response technique as used in the Taiwan outcome of pregnancy study. Studies in Family Planning 3(11): 265-269. November 1972.

101. CHO, L.-J. Effects of abortion in fertility transitions in East Asia. In: International Union for the Scientific Study of Population [IUSSP]. International Population Conference Mexico 1977. Vol. 3. Liège, Belgium, IUSSP, 1977. p. 251-263.

102. CHOW, A.W., MARSHALL, J.R., and GUZE, L.B. A double-blind comparison of clindamycin with penicillin plus chloramphenicol in treatment of septic abortion. Journal of Infectious Diseases 135(Suppl.): S35-S39. March 1977.

103. CHOW, L.P. Abortion in Taiwan. In: Hall, R.E., ed. Abortion in a changing world. Vol. 1. (Proceedings of an International Conference, Hot Springs, Virginia, November 17-20, 1968) New York, Columbia University Press, 1970. p. 251-259.

104. CHOW, L.P., GRUHN, W., and CHANG, W.P. Feasibility of the randomized response technique in rural Ethiopia. American Journal of Public Health 69(3): 273-276. March 1979.

105. CHURCHILL, C., LORFING, I., ZURAYK, H., and AZAR, J. Beirut. In: Omran, A.R. and Standley, C.C., eds. Family formation patterns and health: an international collaborative study in India, Lebanon, Philippines, and Turkey. Geneva, Switzerland, World Health Organization, 1976. p. 174-182.

106. COLE, L.P., COLVEN, C.E., and GOLDSMITH, A. Tubal occlusion via laparoscopy in Latin America: an evaluation of 8186 cases. International Journal of Gynaecology and Obstetrics 17(3): 253-259. 1979.

107. COLEMAN, B.D. Septic shock in pregnancy. Obstetrics and Gynecology 24(6): 895-902. December 1964.

108. COLLINS, J.A., ALLEN, H.H., and YUZPE, A.[illegible] Outpatient management of first trimester therapeutic abortions with and without tubal ligation. Canadian Medical Association Journal 106: 1077-1080. May 20, 1972.

109. COMAS, M.R. and CAVANAGH, D. The clinical picture. In: Cavanagh, D., Rao, P.S., and Comas, M.R. Septic shock in obstetrics and gynecology. Philadelphia, Pennsylvania, W.B. Saunders, 1977. (Major Problems in Obstetrics and Gynecology, Vol. 11) p. 77-85.

110. COMAS, M.R. and CAVANAGH, D. Monitoring the patient in septic shock. In: Cavanagh, D., Rao, P.S., and Comas, M.R. Septic shock in obstetrics and gynecology. Philadelphia, Pennsylvania, W.B. Saunders, 1977. (Major Problems in Obstetrics and Gynecology, Vol. 11) p. 86-93.

111. COOK, M.J. and LEOPRAPAI, B. Some observations on abortion in Thailand. Presented at the Asian Regional Research Seminar on Psychosocial Aspects of Abortion, Kathmandu, Nepal, November 26-29, 1974. 14 p.

112. CORVALAN, H. The abortion epidemic. In: Potts, M. and Bhiuvandiwala, P., eds. Birth control: an international assessment. Lancaster, England, MTP Press, 1979. p. 201-214.

113. CORVALAN, H. Unwanted pregnancies: a proposed programme of control in Africa. In: Sai, F.T., ed. A strategy for abortion management: report of an IPPF Africa regional workshop. London, International Planned Parenthood Federation, December 1978. p.

114. COUREL, A. and POOL, D.I. Upper Volta. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1970. p. 701-719.

115. CZERNOBILSKY, B. Pathology of septic abortion. In: Schwarz, R.H. Septic abortion. Philadelphia, Pennsylvania, J.B. Lippincott, 1968. p. 23-51.

116. DABBAS, H. Abortion in Jordan. In: Nazer, I.R., ed. Induced abortion: a hazard to public health? (Proceedings of the 1st Conference of the IPPF Middle East and North Africa Region, Beirut, Lebanon, February 1971) Beirut, Lebanon, International Planned Parenthood Federation, 1972. p. 201-207.

117. DA CUNHA, S.P. [Hospital das Clínicas, Ribeirão Prêto] [Abortion in Brazil] Personal communication, October 3, 1979.

118. DAHM, C.H., Jr., OSTAPOWICZ, F., and CAVANAGH, D. Use of cephalothin in septic abortion. Obstetrics and Gynecology 41(5): 693-696. May 1973.

119. DANESHBOD, K., BORAZJANI, G.K., SAJADI, H., and HAMIDZADEH, M.M. Survey of maternal deaths in south Iran: analysis of 96 autopsies. Journal of Obstetrics and Gynaecology of the British Commonwealth 77: 1103-1108. December 1970.

120. DAVID, P. Abortion: the Indian experience. People 5(2): 16-17. 1978.

121. DEAN, C.E. and PIOTROW, P.T. Eighteen months of legal change. Population Reports, Series E, No. 1. Population Information Program, July 1974. 12 p.

122. DEANE, R.M. and RUSSELL, K.P. Enterobacillary septicemia and bacterial shock in septic abortion. American Journal of Obstetrics and Gynecology 79(3): 528-541. March 1960.

123. DEL RIO, G., GRUDSKY, C., MONETTA, O., and HERRERA, M. Manejo del shock endotoxico en el aborto. [Management of endotoxin shock in abortion.] [SP] Revista Chilena de Obstetricia y Ginecologia 41(3): 166-173. 1976.

124. DE MENDOZA, A.M., MORRIS, L., ANDERSON, J.E., WARREN, C.W., CONN, J., and RAMICK, M. El Salvador contraceptive prevalence survey: 1978. [Tables] Report submitted to the U.S. Agency for International Development, Office of Population, August 15, 1979. 50 p.

125. DENNISON, C. [National Center for Health Statistics] [Tonsillectomy deaths in the US] Personal communication, April 25, 1980.

*126. DEVEREUX, G. A study of abortion in primitive societies. New York, International Universities Press, 1976. 414 p.

*127. DJERASSI, C. Fertility limitation through contraceptive steroids in the People's Republic of China. Studies in Family Planning 5(1): 13-30. January 1974.

128. DOUGLAS, G.W. and BECKMAN, E.M. Clinical management of septic abortion complicated by hypotension. American Journal of Obstetrics and Gynecology 96(5): 633-644. November 1, 1966.

129. DOW, E., Jr. and BENJAMIN, E. Demographic trends and implications. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 427-455.

130. DUVA PALACIOS, J. and ACOSTA BENDEK, E. El aborto séptico y su aspecto económico social. [Septic abortion and its socioeconomic aspects.] [SP] Revista Chilena de Obstetricia y Ginecologia 38(1): 15-19. 1974.

131. DZIEWULSKA, W. Past abortions and the fate of consequent pregnancies: 1. Course of gestation. Ginekologia Polska 44: 1003-1011. 1973.

132. EASTMAN, N.J. and HELLMAN, L.M. Williams obstetrics. 13th ed. New York, Appleton-Century-Crofts, 1966. 1180 p.

133. ECHEVERRY, G. Family planning in the immediate postpartum period. Studies in Family Planning 4(2): 33-35. February 1973.

134. EDSTRÖM, K.G.B. Early complications and late sequelae of induced abortion: a review of the literature. Bulletin of the World Health Organization 52(2): 123-139. 1975.

135. EDSTRÖM, K.G.B. The relative risks of sterilization alone and in combination with abortion. Bulletin of the World Health Organization 52(2): 141-148. 1975.

136. EL-KASHLAN, K., EL-KHOLI, G., and EL-DEEB, H.A. Induced abortions recorded "spontaneous" in hospital admission. Egyptian Population and Family Planning Review 7(2): 79-85. December 1974.

137. EL-KHOLI, G.E.Y. and ABBAS, A.M.A. The problem of septic abortion in Tanta University Hospital: a clinical and bacteriological study. Egyptian Population and Family Planning Review 9(1): 7-13. June 1976.

138. ESTRADA, A., HEREDIA, R., PRADA, E., RIVERA, J., and UMANA, M. Caracteristicas socio-demográficas de las mujeres Colombianas: Encuesta Nacional de Fecundidad: parte rural. [Sociodemographic characteristics of Colombian women: National Survey of Fecundity: rural part.] [SP] Bogotá, Colombia, Asociación Colombiana de Facultades de Medecina, December 1972. (Encuesta Nacional de Fecundidad No. 2) 95 p.

139. FAUNDES, A. and HARDY, E. Contraception and abortion services at Barros Luco Hospital, Santiago, Chile. In: David, H.P., Friedman, H.L., van der Tak, J., and Sevilla, M.J., eds. Abortion in psychosocial perspective: trends in transnational research. New York, Springer, 1978. (Transnational Family Research Institute) p. 284-297.

140. FAUNDES, A. and LUUKKAINEN, T. Health and family planning services in the Chinese People's Republic. Studies in Family Planning 3(7, Suppl.): 165-176. July 1972.

141. FAUNDES, A., RODRIGUEZ-GALANT, G., and AVENDANO, O. The San Gregorio experimental family planning program: changes observed in fertility and abortion rates. Demography 5(2): 836-845. 1968.

142. FERGUSON, J.G. and GOLDSMITH, A. Incomplete abortion in Latin America. IPPF Medical Bulletin 10(5): 3-4. October 1976.

143. FIGA-TALAMANCA, I. Estimating the incidence of induced abortion in Italy. Genus 32(1-2): 91-107. 1976.

144. FISEK, N.H. Epidemiological study on abortion in Turkey. In: Nazer, I.R. ed. Induced abortion: a hazard to public health? (Proceedings of the 1st Conference of the IPPF Middle East and North Africa Region, Beirut, Lebanon, February 1971) Beirut, Lebanon, International Planned Parenthood Federation, 1972. p. 264-283.

145. FISHBURNE, J.I., EDELMAN, D.A., HULKA, J.F., and MERCER, J.P. Outpatient laparoscopic sterilization with therapeutic abortion versus abortion alone. Obstetrics and Gynecology 45(6): 665-668. June 1975.

146. FLAVIER, J.M. and CHEN, C.H.C. Induced abortion in rural villages of Cavite, the Philippines: knowledge, attitudes, and practice. Studies in Family Planning 11(2): 65-71. February 1980.

147. FODA, M.S. Abortion in the U.A.R.: a comparative study of various socio-economic groups. In: Nazer, I.R., ed. Induced abortion: a hazard to public health? (Proceedings of the 1st Conference of the IPPF Middle East and North Africa Region, Beirut, Lebanon, February 1971) Beirut, Lebanon, International Planned Parenthood Federation, 1972. p. 122-135.

148. FREEDMAN, R., COOMBS, L.C., CHANG, M.-C., and SUN, T.-H. Trends in fertility, family size preferences, and practice of family planning: Taiwan, 1965-1973. Studies in Family Planning 5(9): 270-288. September 1974.

149. FREIMAN, S.M. and WULFF, G.J. L. Management of uterine perforation following elective abortion. Obstetrics and Gynecology 50(6): 647-650. December 1977.

150. GALBINSKI, A. Contribuição ao estudo da epidemiologia do abôrto provocado. [Contribution to the study of epidemiology of induced abortion.] [PT] Jornal Brasileiro de Ginecologia 71(4): 201-208. [1971].

151. GALL, N. Births, abortions, and the progress of Chile. American Universities Fieldstaff Reports, West Coast South America Series 19(2): 1-10. May 1972.

152. GALLEGOS, A., GARCIA PENA, J., SOLIS, J.A., and KELLER, A. Recent trends in contraceptive use in Mexico. Studies in Family Planning 8(8): 197-204. August 1977.

153. GALLEN, M. Abortion choices in the Philippines. Journal of Biosocial Sciences 11(3): 281-288. July 1979.

154. GALLEN, M. [International Projects Assistance Services] [Abortion practices in the Philippines] Personal communication, March 18, 1980. 10 p.

*155. GALLEN, M. Abortion practices in the Philippines: an exploratory study among clients and practitioners, circa 1979. (A research project sponsored by the International Committee on Applied Research in Population [ICARP] May 1980) Cebu City, Philippines, Southwestern University, College of Medicine, Department of Family Planning, May 1980. 105 p.

156. GALLEN, M. Massage abortion. [Letter] People 6(4): 2. 1979.

157. GASLONDE, S. Análisis preliminar de algunos datos sobre aborto provenientes de encuestas en America Latina. [Preliminary analysis of data on abortion from Latin American surveys.] [SP] Santiago, Chile, Centro Latinoamericano de Demografía, September 1973. (CELADE Serie A, No. 118) 102 p.

*158. GASLONDE, S. Studies on fertility and abortion in Asuncion, Bogota, Buenos Aires, Lima, and Panama City. In: Pan American Health Organization [PAHO], and Transnational Family Research Institute. Epidemiology of abortion and practices of fertility regulation in Latin America: selected reports. Washington, D.C., PAHO, 1975. (Scientific Publication No. 306) p. 9-25.

159. GASLONDE, S. and CARRASCO, E. Una encuesta modelo para evaluar la eficacia de los programas de planificación familiar: su aplicación a cinco ciudades de Paraguay. [A survey to evaluate the efficacy of family planning programs: its application to five cities in Paraguay.] [SP] Santiago, Chile, Latinoamericano de Demografía, October 1975. (CELADE Serie A, No. 119) 235 p.

160. GASLONDE SAINZ, S. Abortion research in Latin America. Studies in Family Planning 7(8): 211-217. August 1976.

161. GHALI, F.H. Abortion in Iraq: a preliminary report. In: Nazer, I.R., ed. Induced abortion: a hazard to public health? (Proceedings of the 1st Conference of the IPPF Middle East and North Africa Region, Beirut, Lebanon, February 1971) Beirut, Lebanon, International Planned Parenthood Federation, 1972. p. 197-200.

162. GHOSN, G. Report on abortion from the French University Hospital, Beirut. In: Nazer, I.R., ed. Induced abortion: a hazard to public health? (Proceedings of the 1st Conference of the IPPF Middle East and North Africa Region, Beirut, Lebanon, February 1971) Beirut, Lebanon, International Planned Parenthood Federation. 1972. p. 233-238.

163. GOLDBERG, L.I. Drug therapy: dopamine: clinical uses of an endogenous catecholamine. New England Journal of Medicine 291(14): 707-710. October 3, 1974.

164. GOLDSMITH, A., EDELMAN, D.A., and BRENNER, W.E. Contraception immediately post-abortion. Presented at the 12th Annual Scientific Meeting of the Association of Planned Parenthood Physicians, Memphis, Tennessee, April 16-17, 1974. Chapel Hill, North Carolina, International Fertility Research Program, 1974. 13 p.

165. GOLDSMITH, A., GOLDBERG, R., EYZAGUIRRE, H., and LIZANA, L. Immediate postabortal intrauterine contraceptive device insertion: a double-blind study. American Journal of Obstetrics and Gynecology 112(7): 957-962. April 1, 1972.

166. GOLDSMITH, A., GOLDBERG, R., EYZAGUIRRE, H., LUCERO, S., and LIZANA, L. IUD insertion in the immediate postabortal period. In: Goldsmith, A. and Snowden, R., eds. Proceedings of the Family Planning Research Conference: a multidisciplinary approach. Netherlands, Reidel, Dordrecht, 1972. p. 59-67.

167. GOLDSMITH, A., GUTIERREZ, H., and SANHUEZA, H. Chile. Country Profiles, October 1970. p. 1-10.

168. GOODMAN, L.S. and GILMAN, A. The pharmacological basics of therapeutics. 4th ed. New York, Macmillan, 1970. 1794 p.

169. GOODNO, J.A., Jr., CUSHNER, I.M., and MOLUMPHY, P.E. Management of infected abortion: an analysis of 342 cases. American Journal of Obstetrics and Gynecology 85(1): 16-23. January 1, 1963.

170. GOSSELIN, R.E., HODGE, H.C., SMITH, R.P., and GLEASON, M.N. Clinical toxicology of commercial products. 4th ed. Baltimore, Maryland, Williams and Wilkins, 1976. 1790 p.

171. GOYAL, R.S. Legalisation of abortion: a social perception. Health and Population: Perspectives and Issues 1(4): 302-308. October-December 1978.

172. GRAUER, H. A study of contraception as related to unwanted pregnancy. Canadian Medical Association Journal 107: 739-740. October 21, 1972.

173. GREBENIK, E. and HILL, A. International demographic terminology: fertility, family planning and nuptiality. International Union for the Scientific Study of Population Papers, No. 4. [1974]. 53 p.

174. GRECH, E.S., GALEA, J., and TRUSSELL, R.R. Maternal mortality in Uganda. International Journal of Gynaecology and Obstetrics 7(6): 263-278. December 1969.

*175. GRIMES, D.A. and CATES, W., Jr. Complications from legally-induced abortion: a review. Obstetrical and Gynecological Survey 34(3): 177-191. March 1979.

*176. GRIMES, D.A., CATES, W., Jr., and SELIK, R.M. Fatal septic abortion in the United States, 1975-1977. Atlanta, Georgia, U.S. Department of Health, Education, and Welfare, Center for Disease Control, [1980]. 23 p.

177. GUDGEON, D. Sterilisation on abortion. [Letter] Lancet 1: 1240. June 12, 1971.

178. GUEST, I. Infertility in Africa. People 5(1): 23-34. 1978.

179. GUIDO, C., GARCIA, A.M., and NAVAS, D. Analisis de 2746 abortos atendidos en el Hospital General de Managua. [Analysis of 2746 treated abortions in the General Hospital of Managua.] [SP] International Surgery 56(2): 125-127. August 1971.

180. GUPTA, I., GUPTA, A.N., and DEVI, P.K. Vaginal tubal ligation concurrent with medical termination of pregnancy. Indian Journal of Medical Research 70: 960-964. December 1979.

181. HAN, D.W. and CHO, N.H. Korea (South). Studies in Family Planning 9(9): 238-241. September 1978.

182. HARDAWAY, R.M., 3rd. Treatment of shock. Comprehensive Therapy 5(3): 14-25. March 1979.

183. HARDY, E. and HERUD, K. Effectiveness of a contraceptive education program for post abortion patients in Chile. Studies in Family Planning 6(7): 188-191. July 1975.

184. HARFOUCHE, J.L. Abortion in Lebanon. In: Nazer, I.R., ed. Induced abortion: a hazard to public health? (Proceedings of the 1st Conference of the IPPF Middle East and North Africa Region, Beirut, Lebanon, February 1971) Beirut, Lebanon, International Planned Parenthood Federation. 1972. p. 239-254.

185. HARRELL-BOND, B. Some influential attitudes about family limitation and the use of contraceptives among the professional group in Sierra Leone. In: Caldwell, J.C., ed. Population growth and socio-economic change in West Africa. New York, Columbia University Press, 1975. p. 473-492.

186. HARRINGTON, J.A. Education, female status, and fertility in Nigeria. Presented at the Population Association of America, Atlanta, Georgia, April 15, 1978. 49 p.

187. HARRISON, P. On the septic ward. People 4(3): 12-13. 1977.

188. HATHOUT, H. Looking at abortion material. In: Nazer, I.R., ed. Induced abortion: a hazard to public health? (Proceedings of the 1st Conference of the IPPF Middle East and North Africa Region, Beirut, Lebanon, February 1971) Beirut, Lebanon, International Planned Parenthood Federation, 1972. p. 216-232.

189. HELLMAN, L.M. and PRITCHARD, J.A. Williams obstetrics. 14th ed. New York, Appleton-Century-Crofts, 1971. 1242 p.

190. HENIN, R.A., EWBANK, D., and HOGAN, H., eds. The demography of Tanzania: an analysis of the 1973 national demographic survey of Tanzania. Vol. 6. Dar es Salaam, Tanzania, Bureau of Statistics, Ministry of Finance and Planning and the Demographic Unit, Bureau of Resource Assessment and Land Use Planning, 1973. p. 16-17.

191. HENRY, A. and PIOTROW, P.T. Age at marriage and fertility. Population Reports, Series M, No. 4. Population Information Program, November 1979. 56 p.

192. HERNANDEZ, I.M., PERRY, G., KATZ, A.R., and HELD, B. Postabortal laparoscopic tubal sterilization: results in comparison to interval procedures. Obstetrics and Gynecology 50(3): 356-358. September 1977.

193. HIMES, N.E. Medical history of contraception. New York, Shocken Books, 1970. 521 p.

194. HOGUE, C.J., KLEINBAUM, D.G., OMRAN, A.R., GRUBER, F.J., and FREEMAN, D.H., Jr. The impact of personal characteristics on post-abortion contraceptive acceptance. Presented at the 102nd Annual Meeting of the American Public Health Association, New Orleans, Louisiana, October 20-24, 1974. Chapel Hill, North Carolina, International Fertility Research Program, 1974. (AID/csd 2979) 38 p.

195. HOGUE, C.J.R. Review of postulated fertility complications subsequent to pregnancy termination. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Risks, benefits and controversies in fertility control. (Proceedings of the workshop, Arlington, Virginia, March 13-16, 1977) Hagerstown, Maryland, Harper and Row, 1978. (PARFR Series on Fertility Regulation) p. 356-367.

*196. HOLLERBACH, P.E. Fertility-related policies and trends in pre- and post-revolutionary Cuba. New York, Population Council, Center for Policy Studies, 1980. 63 p. (To be published in International Family Planning Perspectives)

*197. HONG, S.-B. and TIETZE, C. Survey of abortion providers in Seoul, Korea. Studies in Family Planning 10(5): 161-163. May 1979.

*198. HONG, S.-B. and WATSON, W. B. The increasing utilization of induced abortion in Korea. Seoul, Korea, Korea University Press, May 1976. (A Monograph in the 1971 Fertility-Abortion Survey Special Report Series of Korean Institute for Family Planning) 181 p.

199. HUE, K., KWON, H.Y., MICHAEL, P.H., and WATSON, W.B. A comparative study of the safety and efficacy of postabortal intrauterine contraceptive device insertion. American Journal of Obstetrics and Gynecology 118(7): 975-978. April 1, 1974.

200. HUNTE, P., SAFI, M., MACEY, A., and KERR, G. Indigenous fertility regulation methods in Afghanistan. In: Afghanistan and U.S. Agency for International Development. National Demographic and Family Guidance Survey of the Settled Population of Afghanistan. Vol. 4. Folk methods of fertility regulation; and the traditional birth attendant (the dai). [Kabul, Afghanistan], Central Statistics Office, 1975. (Family Guidance Research Report No. 8) 59 p.

201. HUNTINGFORD, P. Mortality and morbidity of abortion. [Letter] Lancet 1: 1012-1013. May 15, 1971.

202. HUSTING, E.L. Preliminary report on interviews with postabortal patients at Victoria Jubilee Hospital. Report submitted to the medical director of the National Family Planning Board of Jamaica, Dr. Wynante Patterson. [1972]. 72 p.

203. HUSTING, L., ARIEY, M., and PATTERSON, W. Aspects of illegal abortion in Jamaica. Presented at the 104th Annual Meeting of the American Public Health Association. Miami Beach, Florida, October 17-21, 1976. 8 p.

204. HUTCHINSON, B. Induced abortion in Brazilian married women. America Latina 7(4): 21-33. October-December 1964.

205. INSTITUTO DE SEGURIDAD Y SERVICIOS SOCIALES DE LOS TRABAJADORES DEL ESTADO [ISSSTE]. SUBDIRECCION MEDICA JEFATURA DE LOS SERVICIOS TECNICO NORMATIVOS. Programa de Planificación Familiar: evaluación operacional: Enero-Junio 1978. [Family Planning Program: operational evaluation: January-June 1978.] [SP] [Mexico City, Mexico], ISSSTE, July 1978. 13 p.

*206. INTERNATIONAL FERTILITY RESEARCH PROGRAM [IFRP], RESEARCH DEPARTMENT STAFF. Abortion in Latin America. Research Triangle Park, North Carolina, IFRP, March 1980. (Research Report DDX 005) 79 p.

207. INTERNATIONAL PLANNED PARENTHOOD FEDERATION [IPPF]. Abortion: classification and techniques. London, IPPF, 1971. 27 p.

208. INTERNATIONAL PLANNED PARENTHOOD FEDERATION [IPPF]. Family planning in Chile: a profile of the development of policies and programmes. London, IPPF, [1980]. 25 p.

209. INTERNATIONAL PLANNED PARENTHOOD FEDERATION [IPPF]. Family planning in Colombia: a profile of the development of policies and programmes. London, IPPF, October 1979. 47 p.

210. INTERNATIONAL PLANNED PARENTHOOD FEDERATION [IPPF]. IPPF survey of unmet needs in family planning 1971-76. London, IPPF, December 1977. 30 p.

211. INTERNATIONAL PLANNED PARENTHOOD FEDERATION [IPPF]. OFFICE OF EVALUATION AND STATISTICS. Survey of world needs in family planning. London, IPPF, 1974. 117 p.

212. ISAACS, S.L. and SANHUEZA, H. Induced abortion in Latin America: the legal perspective. In: Pan American Health Organization [PAHO], and Transnational Family Research Institute. Epidemiology of abortion and practices of fertility regulation in Latin America: selected reports. Washington, D.C., PAHO, 1975. (Scientific Publication No. 306) p. 39-52.

213. ISLAM, K. [Gonosasthaya Kendra, Nayarhat, Savar, Dacca, Bangladesh] [Abortion in Bangladesh] Personal communication, November 11, 1979. 2 p.

214. JABEEN S., NAZMUL, S., and AHMED, G. A study of the abortion related cases admitted in Sir Salimullah Medical College Hospital, Dacca. Presented at the Annual Contributors' Conference of Bangladesh Fertility Research Programme, Dacca, November 8, 1979. Dacca, Bangladesh, Bangladesh Fertility Research Programme, November 1979. (Technical Report No. 35) 16 p.

215. JAFFE, F.S. and OAKLEY, D. Observations on birth planning in China, 1977. Family Planning Perspectives 10(2): 101-108. March-April 1978.

216. JAHN, S.A.A. [Water Purification Project, Khartoum, Sudan] [Nonmedical abortion methods in Sudan] Personal communication to S. Coleman, May 22, 1979. 2 p.

217. JALALI, G.H. and PEYMAN, H. Study and statistical analysis of abortion in Farah Maternity Hospital, Teheran. Presented at the Near and Middle East Medical Conferences, Istanbul, Turkey, September 10-14, 1972. 12 p.

218. JANAKI, P., KANG, K., and KRISHNA, U. Observations on 72 cases of septic abortions. Journal of Obstetrics and Gynaecology of India 28(2): 229-234. April 1978.

219. JEMAI, Y. Abortion in Tunisia: a realistic approach. [Abstract only] Population Studies, No. 49, April-June 1979. p. 16-18.

220. JUBIZ H., A., DE LA HOZ P., L., and HUERTA, M. Estudio sobre aborto septico (Octubre 15 de 1968 a Octubre 14 de 1969). [Study of septic abortion (October 15, 1968 to October 14, 1969).] [SP] Revista Colombiana de Obstetricia y Ginecologia 22(4): 233-246. July-August 1971.

221. KAHAN, R.S., BAKER, L.D., and FREEMAN, M.G. The effect of legalized abortion on morbidity resulting from criminal abortion. American Journal of Obstetrics and Gynecology 121(1): 114-116. January 1, 1975.

222. KAMAL, I., GHONEIM, M.A., TALAAT, M., ABDALLAH, M., EID, M., and EL HAMAMSY, L.S. An attempt at estimating the magnitude and probable incidence of induced abortion in the U.A.R.: the economic impact of induced abortion on the University Hospital maternity beds (1969). In: Nazer, I.R., ed. Induced abortion: a hazard to public health? (Proceedings of the 1st Conference of the IPPF Middle East and North Africa Region, Beirut, Lebanon, February 1971) Beirut, Lebanon, International Planned Parenthood Federation, 1972. p. 136-167.

223. KAMALA, D.P.S., JAYALAKSHMI, R., and MANUEL, M. Morbidity and mortality due to septic induced abortion: an analysis of 380 cases at the Government Erskine Hospital, Madurai. In: Pachauri, S., ed. Sixth transactions of scientific papers presented at the Contrib-

utors' Conference of the India Fertility Research Programme, held at Bombay on March 3, 1979. Calcutta, India, India Fertility Research Programme, 1979. p. 15-27.

224. KAMEL, W.H., HANNA, A.T., KAMEL, N.A., and WAHDAN, M.H. Family planning sudies: the teachers' survey. Pt. 2. Fertility differentials and practice of family planning. Egyptian Population and Family Planning Review 3(1): 37-66. June 1970.

225. KAPOOR, K. and QUADROS, M. A comparative study of sepsis as a complication of M.T.P. and induced abortion. Journal of Obstetrics and Gynaecology of India 29(2): 264-268. April 1979.

226. KARACADAĞ, O. [Anadolu University, School of Medicine, Eskişehir, Turkey] [Abortion in Turkey] Personal communication, April 1, 1980.

227. KARACADAĞ, O. [The problems of rapid population expansion in Turkey.] Presented at the Johns Hopkins Program for International Education in Gynecology and Obstetrics Training Course on Advances in Reproductive Health, Baltimore, Maryland, March 24-April 4, 1980. 5 p.

228. KATAGIRI, T. and TERAO, T. Family planning in the People's Republic of China: report on first official IPPF visit. IPPF Medical Bulletin 6(3): 1-3. June 1972.

229. KENDALL, M. The world fertility survey: current status and findings. Population Reports, Series M, No. 3. Population Information Program, July 1979. 32 p.

230. KING, T. [Johns Hopkins Hospital] [Medical management of septic abortion and septic shock] Personal communication, April 30, 1980.

231. KLEINMAN, R.L. and SENANAYAKE, P., eds. Handbook on infertility. London, International Planned Parenthood Federation, 1979. 58 p.

232. KLINGER, A. Demographic aspects of abortion: summary of the organizer. In: International Union for the Scientific Study of Population [IUSSP]. International Population Conference, London 1969. Vol. 2. Liège, Belgium, IUSSP, 1971. p. 1153-1165.

233. KOCHHAR, M. Review of pelvic inflammatory disease at Kasturba Hospital, Delhi (India). Presented at the International Symposium on Pelvic Inflammatory Disease, Center for Disease Control, Atlanta, Georgia, April 1-3, 1980. 16 p.

234. KOETSAWANG, S., GORDON, J., and PACHAURI, S. Spontaneous and illegally induced abortions at Siriraj Hospital, Bangkok. Presented at the 1st Scientific Congress in Family Planning, Colombo, Sri Lanka, January 21-26, 1974. Chapel Hill, North Carolina, International Fertility Research Program, November 1973. (AID/csd 2979) 23 p.

235. KOETSAWANG, S., SAHA, A., and PACHAURI, S. Study of abortion in Thailand. Presented at the 19th All India Congress on Obstetrics and Gynaecology, Jamshedpur, India, December 27-30, 1975. Chapel Hill, North Carolina, International Fertility Research Program, 1975. (Pregnancy Termination Series No. 76) 20 p.

236. KOREA. ECONOMIC PLANNING BOARD. NATIONAL BUREAU OF STATISTICS. and THE KOREAN INSTITUTE FOR FAMILY PLANNING. The Korean national fertility survey. First country report, 1974. Seoul, Korea, National Bureau of Statistics, December 1977. (World Fertility Survey) 863 p.

237. KOWEN, D.E., HANSLO, D.H., BOTHA, P.L., and DAVEY, D.A. Incidence of aerobic and anaerobic infection in patients with incomplete abortion. South African Medical Journal 55(4): 129-132. January 27, 1979.

238. KRISHNA MENON, M.K. A recent program of legal abortion in India. In: Zatuchni, G.I., Sciarra, J.J., and Speidel, J.J., eds. Pregnancy termination: procedures, safety, and new developments. (Proceedings of a workshop and postgraduate course, Nassau, Bahamas, May 23-26, 1978) Hagerstown, Maryland, Harper and Row, 1979. (PARFR Series on Fertility Regulation) p. 395-398.

239. KRZNAR, B., RAJHVAJN, B., NEŽIĆ, J., and ŠULHOF, L.J. Present day treatment of endotoxic shock in septic abortion. Acta Medica Iugoslavica 25(1): 23-36. 1971.

240. KUMEKPOR, T.K. Rural women and attitudes to family planning, contraceptive practice and abortion in Southern Togo: a report of a pilot survey in the Maritime Region of the Republic of Togo. Legon, Ghana, University of Ghana, Department of Sociology, 1970. (Socio-Demographic Study of the Republic of Togo, Report No. 1) 30 p.

241. KUMEKPOR, T.K. Socio-cultural dimensions of abortion in selected West African countries. Presented at the International Planned Parenthood Federation Conference on the Medical and Social Aspects of Abortion in Africa, Accra, Ghana, December 12-18, 1973. 21 p.

242. LAKERU, A.A. Abortion in Lagos as seen at the Lagos Island Maternity Hospital. New York, Population Council, Postpartum Program, May 1974. 17 p.

*243. LANDESMAN, S.H. and GORBACH, S.L. Gram negative sepsis and shock. Orthopedic Clinics of North America 9(3): 611-625. July 1978.

244. LANE, E., AZEVEDO, C.P., and PINOTTI, J.A. Conhecimento e aceitação de métodos anticoncepiconais após a ortamento. [Knowledge and acceptance of post abortion contraceptive methods.] [PT] Jornal Brasileiro de Ginecologia 81(6): 271-274. June 1976.

245. LANMAN, J.T., KOHL, S.G., and BEDELL, J.H. Changes in pregnancy outcome after liberalization of the New York State abortion law. American Journal of Obstetrics and Gynecology 118(4): 485-492. February 15, 1974.

246. LARAQUI, A. Report on Morocco. In: Nazer, I.R., ed. Induced abortion: a hazard to public health? (Proceedings of the 1st Conference of the IPPF Middle East and North Africa Region, Beirut, Lebanon, February 1971) Beirut, Lebanon, International Planned Parenthood Federation, 1972. p. 255-263.

247. LARSEN, T.B. Estimates of induced abortion in some Middle East countries. In: Nazer, I.R., ed. Induced abortion: a public health hazard? (Proceedings of the 1st Conference of the IPPF Middle East and North Africa Region, Beirut, Lebanon, February 1971) Beirut, Lebanon, International Planned Parenthood Federation, 1972. p. 78-101.

248. LARSEN, J.V. Induced abortion. South African Medical Journal 53(21): 853-857. May 27, 1978.

249. LARSSON, B. and HAMBERGER, L. Insertion of Copper-7-IUDs in connection with induced abortions during the first trimester. Contraception 12(1): 69-76. July 1975.

250. LEAN, T.H., CHI, I.-C., WALLMAN, J.A., HARKINS, P.B., and BRENNER, W.E. A comparative study of interval, post-abortion and post-partum sterilization cases in Singapore. Presented at the 102nd Annual Meeting of the American Public Health Association, New Orleans, Louisiana, October 20-24, 1974. (International Fertility Research Program Conference Paper) 15 p.

251. LEAN, T.H., VENGADASALAM, D., and COLE, L.P. A comparison of the clip and ring techniques for laparoscopic sterilization of postabortion and postpartum patients. International Journal of Gynaecology and Obstetrics 16(2): 150-156. September-October 1978.

252. LEDGER, W.J. Management of obstetric and gynecologic infections resulting from trauma. Bulletin of the New York Academy of Medicine 55(2): 241-247. February 1979.

253. LEDGER, W.J. Septic abortion and septic pelvic thrombophlebitis. In: Monif, G.R.G. Infectious diseases in obstetrics and gynecology. Hagerstown, Maryland, Harper and Row, 1974. 275-291.

254. LEMBRYCH, S. Course of pregnancy, delivery, and puerperium following induced abortion of first pregnancy. Zentralblatt fuer Gynaekologie 94: 164-168. February 5, 1977.

255. LERIDON, H. Human fertility: the basic components. Chicago, Illinois, University of Chicago Press, 1977. 202 p.

256. LEWIS, T.L.T. Legal abortion in England and Wales 1968-78. British Medical Journal 280(6210): 295-296. February 2, 1980.

257. LEY, E. [Instituto Mexicano de Seguro Social] [Births, abortion admissions, and family planning in the State of Mexico] Personal communication to H. Davis, June 1980. 13 p.

258. LIM, L.S., CHENG, M.C.E., RAUFF, M., and RATNAM, S.S. Abortion deaths in Singapore (1968-1976). Singapore Medical Journal 20(3): 391-394. September 1979.

259. LIPPES, J. Instructions for the insertion of an intra-uterine loop. (Appendix III) In: Tietze, C. and Lewit, L., eds. Intra-uterine contraceptive devices. (Proceedings of the conference, New York City, April 30-May 1, 1962) New York, Excerpta Medica Foundation, 1962. (International Congress Series No. 54) p. 145-146.

260. LITTLE, B. Intrauterine infections in obstetrics. In: Marcus, S.L. and Marcus, C.C., eds. Advances in obstetrics and gynecology. Baltimore, Maryland, Williams and Wilkins, 1967. p. 138-149.

261. LITTLE, B. and TENNEY, B. Gynecologic infections at the Boston City Hospital. American Journal of Surgery 107: 673-677. May 1964.

262. LIU, D.T.Y., MELVILLE, H.A.H., and MARTIN, T. Subsequent gestational morbidity after various types of abortion. [Letter] Lancet 2(7774): 431. August 26, 1972.

263. LOMONDO, S.R. [Fundacao Universite de Endocrinolosia, Pôrto Alegre, Brazil] [Septic abortion in Brazil] Personal communication, April 21, 1980.

264. LOPEZ-ESCOBAR, G., RIAÑO-GAMBOA, G., and LENIS-NICHOLLS, N. Aborto: interrogantes, comentarios y resultados parciales de algunas investigaciones Colombianas. [Abortion: questions, commentaries and partial results of some Colombian research.] [SP] Bogotá, Colombia, Corporación Centro Regional de Población, Area Biomedica, December 1978. (Monografías de la Corporación Centro Regional de Población, Vol. 8) 64 p.

265. LORINCZ, A.B. Septic abortion. Postgraduate Medicine 49: 148-153. June 1971.

266. LWANGA, C. Abortion in Mulago Hospital, Kampala. East African Medical Journal 54(3): 142-148. March 1977.

267. MABOGUNJE, A.L. Migration and urbanization. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 153-168.

268. MACKENZIE, P. Before and after abortion. Canadian Medical Association Journal 111: 667-671. October 5, 1974.

269. MALHOTRA, S. and DEVI, P.K. A comparative study of induced abortions before and after legalization of abortions. Journal of Obstetrics and Gynaecology of India 29(3): 598-601. June 1979.

270. MARGOLIS, A., RINDFUSS, R., COGHLAN, P., and ROCHAT, R. Contraception after abortion. Family Planning Perspectives 6: 56-60. Winter 1974.

271. MARTINEZ, J.T., FERNANDEZ, G., and VAZQUEZ-LEON, H. Clinical evaluation of new therapeutic concepts in septic shock. Obstetrics and Gynecology 27(2): 296-301. February 1966.

272. MARTINEZ MANAUTOU, J. Segunda reunion de evaluación. [Second evaluation meeting.] [SP] [Mexico City, Mexico], Programa Nacional de Planificación Familiar, May 8, 1980. 14 p.

273. MATHIEU, J. and MANEVILLE, R. Les accoucheuses musulmanes traditionnelles de Casablanca. [Traditional Moslem widwives of Casablanca.] [FR] Paris, Publications de l'Institut des Hautes Etudes Marocaines, 1952. (Vol. 53) 212 p.

274. MATHUR, H.N., DAMODAR, JAIN, T.P., and APTE, V. Analytical study of abortions in rural community. Journal of Obstetrics and Gynaecology of India 29(3): 620-622. June 1979.

275. MATI, J.K.G. Abortion in Africa. In: Sai, F.T., ed. Family welfare and development in Africa. (Proceedings of the IPPF Regional Conference, Ibadan, Nigeria, August 29-September 3, 1976) London, International Planned Parenthood Federation, 1977. p. 74-79.

276. MATURAN, E.G. Folk medicine and health care in Bohol: the Mananambal and the Mananabang. Tagbilaran City, Philippines, Department of Health, Bohol Province Maternal Child Health/Family Planning Project, December 1979. (Research Note No. 59) 41 p.

277. MCKAY, D.G., JEWETT, J.F., and REID, D.E. Endotoxin shock and the generalized Shwartzman reaction in pregnancy. American Journal of Obstetrics and Gynecology 78(3): 546-566. September 1959.

278. MEANS, C.C., Jr. The law of New York concerning abortion and the status of the foetus, 1664-1968: a case of cessation of constitutionality. New York Law Forum 14(3): 411-515. Fall 1968.

279. MEGAFU, U. Bowel injury in septic abortion: the need for more aggressive management. International Journal of Gynaecology and Obstetrics 17(5): 450-453. 1980.

280. MEHRYAR, A.H. and SAJJADI, H. A survey of beliefs and attitudes on induced abortion in an Iranian City. Journal of Family Welfare 34(2): 41-51. December 1977.

281. MEHTA, A.C. Early findings of a cooperative study of abortions in India. Presented at the 10th Annual Meeting of the American Association of Planned Parenthood Physicians, Detroit, Michigan, April 6-7, 1972. Chapel Hill, North Carolina, International Fertility Research Program, 1972. 33 p.

282. MENDOZA-HOYOS, H. Research studies on abortion and family planning in Colombia. Milbank Memorial Fund Quarterly 46(3, Pt. 2): 223-234. July 1968.

283. MEXICO. NATIONAL FAMILY PLANNING PROGRAM. [9th Session of the National Population Council, Mexico City, Mexico, October 28, 1977.] Mexico City, Mexico, National Family Planning Program, [1977]. 47 p.

284. MHANGO, C. [Ministry of Health, MCH, Zambia] [Abortion in Africa] Personal communication, May 20, 1980.

285. MHANGO, C.G. and GRECH, E.S. Family planning programme and abortion laws in Zambia. In: Mwaniki, N., Marasha, M., Mati, J.K.G., and Mwaniki, M.K., eds. Surgical contraception in sub-Sahara Africa. (Proceedings of a Conference, Nyeri, Kenya, May 8-13, 1977) Chestnut Hill, Massachusetts, Pathfinder Fund, 1979. p. 44-56.

286. MIANO, J. [Kenyatta National Hospital, Nairobi, Kenya] [Abortion incidence and treatment] Personal communication, November 9, 1979. 2 p.

287. MILANESI, M.L. O abôrto provocado. [Induced abortion.] [PT] São Paulo, Brazil, Enio Matheus Guazzelli, 1970. 97 p.

288. MILLER, E., MCFARLAND, V., BURNHILL, M.S., and ARMSTEAD, I.W. Impact of abortion experience on contraceptive acceptance. Advances in Planned Parenthood 12(1): 15-28. 1977.

289. MILLER, E.R., PACHAURI, S., and SAHA, A. Patterns of contraceptive acceptance after abortion: a study in four Asian hospitals. Presented at the Annual Meeting of the International Family Planning Research Association, Beverly Hills, California, September 29-October 2, 1976. Chapel Hill, North Carolina, International Fertility Research Program, 1976. (Pregnancy Termination Series No. 96) 12 p.

*290. MILLER, H.A. and OAKS, W.W. Therapy for septic shock. Comprehensive Therapy 5(3): 26-32. March 1979.

291. MOHR, J.C. Abortion in America: the origins and evolution of national policy, 1800-1900. New York, Oxford University Press, 1978. 331 p.

292. MOISSIDÈS, M. Contribution a l'étude de l'avortment dans l'antiquité Grecque. [Contribution to the study of abortion in ancient Greece.] [FR] Janus 26: 59-85, 129-145. 1922.

293. MONIF, G.R.G. and WELKOS, S.L. Infectious morbidity due to *Bacteroides fragilis* in obstetric patients. Clinical Obstetrics and Gynecology 19(1): 131-145. March 1976.

294. MONREAL, T. Determinant factors affecting illegal abortion trends in Chile. In: Holtrop, H.R., Waife, R.S., Bustamente, W., and Rizo, A., eds. New developments in fertility regulation. (A conference for Latin American physicians, Airlie House, Airlie, Virginia, March 28-30, 1976) Chestnut Hill, Massachusetts, Pathfinder Fund, 1976. p. 123-132.

295. MONREAL, T., HEIBY, J.R., and MORRIS, L. Abortos hospitalizados en El Salvador. [Hospital abortions in El Salvador.] [SP] Salud Pública de Mexico 19(3): 387-395. May-June 1977.

296. MONREAL, T., NASAH, B., PALMER, S.J., AMPOFO, A., MATI, J.K.G., LWANGA, C.D., MATANDA, S., and MHANGO, C. Illegal abortion in selected African capital cities, 1976. In: Sai, F.T., ed. A strategy for abortion management: report of an IPPF African Regional Workshop. London, International Planned Parenthood Federation, December 1978. p. 48-91.

297. MOON, H.S., HAN, S.H., and CHOI, S. Fertility and family planning: an interim report on the 1971 fertility-abortion survey. Seoul, Korea, Korean Institute for Family Planning, February 1973. 197 p.

298. MOORE, F.D. Vasoactive agents and fluid replacement. Antibiotics and Chemotherapy 21: 196-197. 1976.

*299. MOORE-ČAVAR, E.C. International inventory of information on induced abortion. New York, Columbia University, International Institute for the Study of Human Reproduction, 1974. 654 p.

300. MORAES, N. Health and population in Brazil. In: Population and the role of law in the Americas. (Proceedings of a seminar of the Human Rights Committee at the 18th Conference of the Inter-American Bar Association, Rio de Janeiro, August 1973) Medford, Massachusetts, Tufts University, Fletcher School of Law and Diplomacy, 1974. (Law and Population Series No. 18) p. 23-25.

301. MORALES, A. [Hospital Gyn/Ob No. 2, CMV-IMSS, Mexico, Mexico] [Abortion in Mexico, specifically in Hospital Gyn/Ob No. 2] Personal communication, February 7, 1980.

302. MORGAN, R.W. and OHADIKE, P.O. Fertility levels and fertility change. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 187-235.

303. MORITZ, C.R. and THOMPSON, N.J. Septic abortion. American Journal of Obstetrics and Gynecology 95(1): 46-54. May 1, 1966.

304. MORIYAMA, Y. and HIROKAWA, O. The relationship between artificial termination of pregnancy and abortion or premature births. In: Harmful effects of induced abortion. Tokyo, Japan, Family Planning Federation of Japan, 1966. p. 64-73.

305. MORRIS, J.A. Therapeutic abortion and concurrent vaginal tubal ligation. Obstetrics and Gynecology 44(1): 144-157. July 1974.

306. MORRIS, L. International trip report: Panama, January 13-23, 1975. [Atlanta, Georgia], U.S. Center for Disease Control, February 10, 1975. 39 p.

307. MORRIS, L., CASTANEDA RUGAMAS, R., DE MENDOZA, A.M., and TAYLOR, S. Contraceptive use and demographic trends in El Salvador. Studies in Family Planning 10(2): 43-52. February 1979.

308. MORRIS, L. and MONREAL, T. International trip report: El Salvador, October 13-19, 1974. [Atlanta, Georgia], U.S. Center for Disease Control, December 30, 1974. 59 p.

309. MOTT, F.L. and FAPOHUNDA, O.J. The population of Nigeria. Lagos, Nigeria, University of Lagos, April 1975. (Human Resources Research Unit No. 3) 100 p.

310. MUHTADIE, A.H. Induced abortion in various sectors of Jordanian society: West Bank of Jordan. In: Nazer, I.R., ed. Induced abortion: a hazard to public health? (Proceedings of the 1st Conference of the IPPF Middle East and North Africa Region, Beirut, Lebanon, February 1971) Beirut, Lebanon, International Planned Parenthood Federation, 1972. p. 208-215.

311. MUKHOPADHYA, P. and DAS, A. Termination of pregnancy by vacuum aspiration with and without sterilization. Journal of Obstetrics and Gynaecology of India 25(5): 593-600. October 1975.

312. MWAMBIA, S.P.K. The Meru of central Kenya. In: Molnos, A., ed. Beliefs and practices. Nairobi, Kenya, East African Publishing House, 1973. (Cultural Source Materials for Population Planning in East Africa, Vol. 3) p. 60-67.

313. MYINT, K.M. [Central Women's Hospital, Rangoon, Burma] [Abortion incidence and treatment] Personal communication, November 9, 1979. 2 p.

314. NAGEL, J.S. Mexico's population policy turnaround. Population Bulletin 33(5): 1-40. December 1978.

315. NAIR, T.K. Counselling in MTP service. Journal of Family Welfare 33(3): 37-42. March 1977.

316, NAKAMURA, M.S. and BARRETO FONSECA, J. de P. São Paulo State Contraceptive Prevalence Survey, PESMI/PUCC/78. Final report. Campinas, Brazil, Pontifical Catholic University of Campinas, June 1979. 86 p.

317. NARKAVONKIT, T. Massage abortion in Thailand. People 6(3): 30. 1979.

318. NARKAVONNAKIT, T. Abortion in rural Thailand: a survey of practitioners. Studies in Family Planning 10(8-9): 223-229. August-September 1979.

319. NASAH, B.T., Aetiology of infertility in the Came Roune. Nigerian Medical Journal 8(5): 452-456. September 1978.

320. NATHANSON, B.N. Management of uterine perforations suffered at elective abortion. American Journal of Obstetrics and Gynecology 114(8): 1054-1059. December 15, 1972.

321. NAVIDI-KASMAII, B.D. and NAHAPETIAN, V. Teheran. In: Omran, A.R. and Standley, C.C., eds. Family formation patterns and health: an international collaborative study in India, Iran, Lebanon, Philippines, and Turkey. Geneva, Switzerland, World Health Organization, 1976. p. 165-174.

322. NAZER, I. The Tunisian experience in legal abortion. International Journal of Gynaecology and Obstetrics 17(5): 488-492. 1979-1980.

323. NAZER, I.R. Abortion in the Near East. In: Hall, R.E., ed. Abortion in a changing world. Vol. 1. (Proceedings of an International Conference, Hot Springs, Virginia, November 17-20, 1968) New York, Columbia University Press, 1970. p. 267-273.

324. NAZER, I.R. Appendix: laws on abortion in some countries of the Middle East and North Africa. In: Nazer, I.R., ed. Induced abortion: a hazard to public health? (Proceedings of the 1st Conference of the IPPF Middle East and North Africa Region, Beirut, Lebanon, February 1971) Beirut, Lebanon, International Planned Parenthood Federation, 1972. p. 384-432.

325. NAZER, I.R. The Middle East and North Africa. In: David, H.P., ed. Abortion research: international experience. Lexington, Massachusetts, D.C. Heath, 1974. p. 237-242.

326. NDETI, K. Abortion in traditional societies: a sociological review of abortion in six East African societies. Presented at the International Planned Parenthood Federation Conference on the Medical and Social Aspects of Abortion in Africa, Accra, Ghana, December 12-18, 1973. 10 p.

327. NEME, B., MATHIAS, L., and PEDRO, L. Obituário materno no abortamento criminoso. [Maternal deaths from criminal abortion.] [PT] Anais Brasileiros de Ginecologia 59(1): 7-10. 1965.

328. NEUWIRTH, R.S. Experience with laparoscopic sterilization related to termination of pregnancy. In: Lewit, S., ed. Abortion techniques and services: proceedings of the conference. New York, New York, June 3-5, 1971. Amsterdam, Netherlands, Excerpta Medica, 1972. p. 58-62.

329. NEUWIRTH, R.S. and FRIEDMAN, E.A. Septic abortion: changing concept of management. American Journal of Obstetrics and Gynecology 85(1): 24-34. January 1, 1963.

330. NEWMAN, L.F. Birth control: an anthropological view. Reading, Massachusetts, Addison-Wesley, 1972. 22 p.

331. NEWMAN, L.F. [Brown University, Department of Community Health] [Widespread use of emmenagogues] Personal communication, October 23, 1979.

332. NEWTON, J., ELIAS, J., and JOHNSON, A. Immediate post-termination insertion of Copper 7 and Dalkon Shield intrauterine contraceptive devices. Journal of Obstetrics and Gynaecology of the British Commonwealth 81(5): 389-392. May 1974.

333. NG, K.H. and SINNATHURAY, T.A. Maternal mortality from septic abortions in University Hospital, Kuala Lumpur from March 1968 to February 1974. Medical Journal of Malaysia 30(1): 52-54. September 1975.

334. NISWONGER, J.W.H., LONDON, G.D., ANDERSON, G.U., and WOLFE, L. Oral contraceptives during immediate postabortal period. Obstetrics and Gynecology 32(3): 325-327. September 1968.

335. NOONAN, J.T., Jr. An almost absolute value in history. In: Noonan, J.T., Jr., ed. The morality of abortion. Cambridge, Massachusetts, Harvard University Press, 1970. p. 1-59.

336. NYGREN, K.-G. and JOHANSSON, E.D.B.. Insertion of the endouterine Copper-T (TCu 200) immediately after first trimester legal abortion. Contraception 7(4): 299-306. April 1973.

337. NYGREN, K.-G. and JOHANSSON, E.D.B. Post abortion insertion of the intrauterine Copper T (TCu 200). In: Hefnawi, I. and Segal, S.J., eds. Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974. Amsterdam, Netherlands, North-Holland, 1975. p. 115-118.

338. OBENG, B.B. The lay use of potassium permanganate as an abortifacient. British Journal of Clinical Practise 22(11): 465-469. November 11, 1968.

339. OJO, O.A. Septic abortion in Ibadan: a ten year review of cases. Presented at the International Planned Parenthood Federation Conference on the Medical and Social Aspects of Abortion in Africa, Accra, Ghana, December 12-18, 1973. 6 p.

340. OJO, O.A. and SAVAGE, V.Y. A ten-year review of maternal mortality rates in the University College Hospital, Ibadan, Nigeria. American Journal of Obstetrics and Gynecology 118(4): 517-522. February 15, 1974.

341. OJO, S.L. et al. [sic] Needs for laws dealing with abortion in Africa. Jimlar Mutane: Journal of the Population Studies in Africa 1(2): 216-231. September 1976.

342. OKOJIE, S.E. Induced illegal abortion in Benin City, Nigeria. International Journal of Obstetrics and Gynaecology 14(6): 517-521. 1976.

343. OLUSANYA, P.O. Nigeria: cultural barriers to family planning among the Yorubas. Studies in Family Planning 37: 13-16. January 1969.

344. OMRAN, A.R., ed. Liberalization of abortion laws: implications. Chapel Hill, North Carolina, Carolina Population Center, 1976. 305 p.

•345. ONETTO, E. [University of Chile] [Abortion in Chile, 1964-1979] Personal communication, April 18, 1980.

346. ONYONKA, Z. Opening address. In: Sai, F.T., ed. A strategy for abortion management: report of an IPPF Africa Regional Workshop. London, International Planned Parenthood Federation, December 1978. p. 1-5.

347. ORDONEZ, B.R. Induced abortion in Mexico City: summary conclusions from two studies conducted by the Mexican Social Security Institute. In: Pan American Health Organization [PAHO], and Transnational Family Research Institute. Epidemiology of abortion and practices of fertility regulation in Latin America: selected reports. Washington, D.C., PAHO, 1975. (Scientific Publication No. 306) p. 26-29.

348. ORY, H. [U.S. Center for Disease Control] [Postabortion oral contraceptive use] Personal communication, November 21, 1979.

349. OSTERGARD, D.R. Comparison of two antibiotic regimens in the treatment of septic abortion. Obstetrics and Gynecology 36(3): 473-474. September 1970.

350. ÖZBAY, F. and SHORTER, F.C. Changes in birth control practices, 1963 to 1968. Studies in Family Planning 51(1): 1-7. March 1970.

351. PADUBIDRI, V. and KOTWANI, B.G. Septic abortions: 5 years review. Journal of Obstetrics and Gynaecology of India 29(3): 593-597. June 1979.

352. PALANICHAMY, G. Impact of abortion hazards on family planning programme. Journal of Obstetrics and Gynaecology of India 26(5): 662-667. October 1976.

353. PALMER, S.J. Abortion in Africa: an expert group report. In: Sai, F.T., ed. A strategy for abortion management: report of an IPPF Africa Regional Workshop. London, International Planned Parenthood Federation, December 1978. p. 23-27.

354. PANDOLFI, A.P. and FACCIOLI, E. Planificação familial num barrio de Pôrto Alegre. [Family planning in a neighborhood of Pôrto Alegre.] [PT] Jornal Brasileiro de Ginecologia 70(5): 273-282. [1970].

355. PARENTE, J.V., MARTINEZ, A.R., JUNIOR, J.G.F., CARVALHO, R.L.de, CARAVAZZO, N.C., and MEIRELLES, R.S. Mortalidade materna no Hospital das Clinicas da Faculdade de Medicina de Ribeirão Prêto (USP) no periodo 1957-1977. Pt. 1. Incidencia. [Maternal mortality in the Hospital das Clinicas, Faculdade de Medicina de Ribeirão Prêto (USP) from 1957 to 1977. Pt. 1. Incidence.] [PT] Jornal Brasileiro de Ginecologia 88(2): 63-67. August 1979.

356. PARK, B.T., CHOI, B.M., and KWON, H.Y. The 1976 National Fertility and Family Planning Evaluation Survey. Seoul, Korea, Korean Institute for Family Planning, February 1979. 294 p.

357. PAUL, B.K. [Zambia Flying Doctor Service] [Abortion in Zambia] Personal communication, November 9, 1979. 2 p.

358. PAULS, F. Abortion profile in Kinshasha, Zaire. Presented at the International Planned Parenthood Federation Conference on the Medical and Social Aspects of Abortion in Africa, Accra, Ghana, December 12-18, 1973. 3 p.

359. PETERSON, W.F. Contraceptive therapy following therapeutic abortion: an analysis. Obstetrics and Gynecology 44(6): 853-857. December 1974.

360. PHILIPS, F.S. and GHOUSE, N. Septic abortion: three year study 1971-1973. Hazards of septic abortion as compared to medical termination of pregnancy at Government Erskine Hospital, Madurai. Journal of Obstetrics and Gynaecology of India 26(5): 652-656. October 1976.

361. PINEDA, A., MORRIS, L., ANDERSON, J.E., CHEN, C.H.C., CONN, J., RAMICK, M., RUBIN, G., and BENUSSI, G. Guatemala Contraceptive Prevalence Survey: 1978. Washington, D.C., U.S. Agency for International Development, October 15, 1979. [Tables] 45 p.

362. PIOTROW, P.T., RINEHART, W., and SCHMIDT, J.C. IUDs: update on safety, effectiveness, and research. Population Reports, Series B, No. 3. Population Information Program, May 1979. 31 p.

363. PLAZA, S. and BRIONES, H. El aborto como problema asistencia. [Abortion as a welfare problem.] [SP] Revista Medica de Chile 91(4): 294-297. April 1963.

364. POPULATION CRISIS COMMITTEE. World abortion trends. Population, No. 9, April 1979. 6 p.

365. PORTER, C.W., Jr. and WAIFE, R.S. Intrauterine devices: current perspectives. Chestnut Hill, Massachusetts, Pathfinder Fund, 1978. 62 p.

366. POTTS, M. [International Fertility Research Program] [Illegal abortion] Personal communication, May 13, 1980.

•367. POTTS, M., DIGGORY, P., and PEEL, J. Abortion. Cambridge, England, Cambridge University Press, 1977. 575 p.

368. POTTS, M., SPEIDEL, J.J., and KESSEL, E. Relative risk of various means of fertility control when used in less-developed countries. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Risks, benefits, and controversies in fertility control. [Proceedings of the workshop, Arlington, Virginia, March 13-16, 1977] Hagerstown, Maryland, Harper and Row, 1978. (PARFR Series on Fertility Regulation) p. 28-51.

369. PREMA, K., GAYATHRI, T.L., and PHILIPS, F.S. Comparative study of early postpartum, postabortal and interval insertion of CuT 200 mm² device. Journal of Obstetrics and Gynaecology of India 28(6): 946-948. December 1978.

370. PRITCHARD, J.A. and MACDONALD, P.C. Williams obstetrics. 15th ed. New York, Appleton-Century-Crofts, 1976. 1003 p.

371. PUFFER, R.R. and GRIFFITH, G.W. Maternal deaths. In: Puffer, R.R. and Griffith, G.W. Patterns of urban mortality. Report of the Inter-American Investigation of Mortality. Washington, D.C., Pan American Health Organization, September 1976. (Scientific Publication No. 151) p. 169-182.

372. PURANDARE, B.N. Postpartum and postabortion sterilization. In: International Fertility Research Program [IFRP]. Female sterilization: current trends and techniques. Chapel Hill, North Carolina, IFRP, 1976. p. 43-48.

373. QUAN, A., DE BADIA, D., and EDELMAN, D. Laparoscopic sterilization after "spontaneous" abortion. Presented at the 8th World Congress on Gynecology and Obstetrics, Mexico City, Mexico, October 18-23, 1976. Chapel Hill, North Carolina, International Fertility Research Program, 1976. (Female Sterilization Series No. 71) 6 p.

374. RAJAN, R. and JOHN, R. Immediate post-termination contraception insertion of Copper T device following menstrual aspiration. Journal of Obstetrics and Gynaecology of India 28(1): 35-39. February 1978.

375. RAMIREZ, A. and GARCIA, E. Algunas implicaciones economicas. [Some economic implications (of abortion study).] [SP] In: Dominican Republic. Universidad Nacional Pedro Henriquez Ureña [UNPHU]. Centro de investigaciones — unidad de estudios sociales. Estudios del aborto en 200 mujeres en la República Dominicána: recomendaciones para la educación en planificación familiar. [Study of abortion in 200 women in the Dominican Republic: recommendations for education in family planning.] [SP] Santo Domingo, Dominican Republic, UNPHU, 1975. p. 149-176.

376. RAMIREZ, E.C.E., RUSSIN, A., JOHNSON, R.L., RAMIREZ, M.A., GARCIA, E., and NOBOA MEFIA, A.E. The preferred risk of illegal abortion in the Dominican Republic. In: David, H.P., Friedman, H.L., van der Tak, J., and Sevilla, M.J., eds. Abortion in psychosocial perspective: trends in transnational research. New York, Springer, 1978. (Transnational Family Research Institute) p. 225-237.

377. RAO, H.K., VASANTHINI, R., and SATYANARAYANA CHAR, R.A. A study of abortion cases in Bangalore City hospitals. Journal of Family Welfare (Bombay) 18(2): 81-87. December 1971.

378. RAO, K.B. Management of induced abortions. In: Hasegawa, T., Hayashi, M., Ebling, F.J.G., and Henderson, I.W., eds. Fertility and sterility. (Proceedings of the 7th World Congress, Tokyo and Kyoto, Japan, October 17-25, 1971) Amsterdam, Netherlands, Excerpta Medica, 1973. p. 814-816.

379. RAO, K.B. Maternal mortality in a teaching hospital in southern India: a 13-year study. Obstetrics and Gynecology 46(4): 379-400. October 1975.

380. RAO, P.S., DAHM, C.H., Jr., and CAVANAGH, D. Pathophysiology. In: Cavanagh, D., Rao, P.S., and Comas, M.R. Septic shock in obstetrics and gynecology. Philadelphia, Pennsylvania, W.B. Saunders, 1977. (Major Problems in Obstetrics and Gynecology, Vol. 11) p. 5-76.

381. RATTAKUL, P. Septic abortion: the scourge of modern obstetrics. Journal of the Medical Association of Thailand 54(5): 312-319. May 1971.

382. RAUM, O.F. The Chaga of north-eastern Tanzania. In: Molnos, A., ed. Beliefs and practices. Nairobi, Kenya, East African Publishing House, 1973. (Cultural Source Materials for Population Planning in East Africa, Vol. 3) p. 27-46.

383. RAVENHOLT, R.T. [U.S. Agency for International Development] [Abortion in China] Personal communication, February 1, 1980.

384. REID, D.E. Assessment and management of the seriously ill patient following abortion. Journal of the American Medical Association 199(11): 141-148. March 13, 1967.

385. REQUENA B., M. Abortion in Latin America. In: Hall, R.E., ed. Abortion in a changing world. Vol. 1. (Proceedings of an International Conference, Hot Springs, Virginia, November 17-20, 1968) New York, Columbia University Press, 1970. p. 338-352.

386. REQUENA B., M. The problem of induced abortion in Latin America. Demography 5(2): 785-799. 1968.

387. REQUENA B., M. Social and economic correlates of induced abortion in Santiago, Chile. [EN, SP] Demography 2: 33-49. 1965.

388. REYNES, J.F. The significance of abortion in Bohol: qualitative and quantitative findings. Tagbilaran City, Philippines, Department of Health, Bohol Province Maternal Child Health/Family Planning Project, October 1979. (Research Note No. 61) 37 p.

389. REYNIAK, J.U., GORDON, M., STONE, M.L., and SEDLIS, A. Endometrial regeneration after voluntary abortion. Obstetrics and Gynecology 45(2): 203-210. February 1975.

390. REYNOSO, L. [Hospital Gineco Obstetricia No. 2, IMSS, Mexico] [Abortion incidence and treatment] Personal communication, November 9, 1979. 2 p.

391. RIANO-GAMBOA, G. [Corporación Centro Regional de Población, Bogotá, Colombia] [Abortion in Colombia] Personal communication, November 8, 1979. 1 p.

392. RIANO-GAMBOA, G., FERGUSON, J.G., and GOLDSMITH, A. Manejo clinico del aborto incompleto en los hospitales universitarios de Colombia. [Clinical management of incomplete abortion in the university hospitals of Colombia.] [SP] Presented at the 11th Colombian Congress of Obstetrics and Gynecology, Barranquilla, Colombia, December 2-6, 1975. [Chapel Hill, North Carolina], International Fertility Research Program, 1975. (Conference Paper Series No. 79 [Abortion]) 25 p.

393. RICE-WRAY, E. The provoked abortion: a major public health problem. American Journal of Public Health 54(2): 313-321. February 1964.

394. RICHARDSON, J.A. and DIXON, G. Effects of legal termination on subsequent pregnancy. British Medical Journal 1(6021): 1303-1304. May 29, 1976.

395. ROCHAT, R.W. [U.S. Center for Disease Control] [Abortion in Bangladesh] Personal communication, July 9, 1980.

396. ROCHAT, R.W. Foreign trip report: London, England, and Beirut, Lebanon, January 13-31, 1980. [Atlanta, Georgia], U.S. Center for Disease Control, March 14, 1980. 18 p.

397. ROCHAT, R.W., MEASHAM, A., OBAIDULLAH, M., ROSENBERG, M., ATIGUR, R.K., and SWRAIYA, J. Abortion mortality in Bangladesh, 1978. [Abstract only] In: American Public Health Association [APHA]. Child and Family Health in America: program and abstracts. 107th Annual Meeting of the APHA, New York, November 4-8, 1979. New York, APHA, 1979. p. 151.

398. RODRIGUES, W., PROENÇA, J.A.G.de, PAIVA, M.A., MATTOSO, F.deQ., AFFONSECA, L.de, PAIVA, O.A.de., NOGUEIRA, T., and MORAES FILHO, B. Law and population in Brazil. Medford, Massachusetts, Tufts University, Fletcher School of Law and Diplomacy, 1975. (Law and Population Monograph Series No. 34) 46 p.

399. RODRIGUES LIMA, O. Abôrto provacado: considerações sôbre um inquérito realizado no Brasil. [Induced abortion: considerations on a survey made in Brazil.] [PT] Rio de Janeiro, Brazil, Editôra Refrigeração, November 1965. 33 p.

400. RODRIQUEZ, G. [World Fertility Survey, London] [World Fertility Survey data on abortion in Colombia] Personal communication, March 1980.

401. ROHT, L.H., AOYAMA, H., LEINEN, G.E., and GALLEN, P.W. The association of multiple induced abortions with subsequent prematurity and spontaneous abortion. Acta Obstetricia et Gynaecologica Japonica 23(2): 140-145. April 1976.

402. ROSARIO, Y.P. Septic abortions and their management. Journal of Obstetrics and Gynaecology of India 20(5): 602-607. October 1970.

403. ROSENBERG, M.J. Resource support services report: Dacca, Bangladesh, May 23 to June 8; Paris, France, June 11 and 12; London, England, June 13 and 14, 1979. Atlanta, Georgia, U.S. Center for Disease Control, July 16, 1979. 40 p.

404. ROSENFIELD, A.G. and CASTADOT, R.G. Early postpartum and immediate postabortion intrauterine contraceptive device insertion. American Journal of Obstetrics and Gynecology 118(8): 1104-1114. April 15, 1974.

405. ROSHAN, S.M. Prevalence of induced abortion in urban Lahore. In: Pakistan. National Research Institute of Fertility Control [NRIFC]. Proceedings of the 8th Seminar on Research in Population Planning, Peshwar, April 18-20, 1974. Karachi, Pakistan, NRIFC [1974]. p. 84-111.

406. ROTHERAM, E.B., Jr. and SCHICK, S.F. Nonclostridial anaerobic bacteria in septic abortion. American Journal of Medicine 46(1): 80-89. January 1969.

407. RUSHWAN, H. Impact of restrictive abortion laws on health services. In: Zatuchni, G.I., Sciarra, J.J., and Speidel, J.J., eds. Pregnancy termination: procedures, safety, and new developments. (Proceedings of a workshop and postgraduate course, Nassau, Bahamas, May 23-26, 1978) Hagerstown, Maryland, Harper and Row, 1979. (PARFR Series on Fertility Regulation) p. 350-352.

408. RUSHWAN, H., DOODOH, A., CHI, I.-C., and BERNARD, R.P. Contraceptive practice after women have undergone "spontaneous" abortion in Indonesia and Sudan. International Journal of Gynaecology and Obstetrics 15(13): 241-249. 1977.

409. RUSHWAN, H.E., FERGUSON, J.G., Jr., and BERNARD, R.P. Hospital counseling in Khartoum: a study of factors affecting contraceptive acceptance after abortion. Presented at the 8th World Congress of Gynaecology and Obstetrics, Mexico City, Mexico, October 17-23, 1976. Chapel Hill, North Carolina, International Fertility Research Program, 1976. (Pregnancy Termination Series No. 98) 9 p.

410. RUSHWAN, H.M.E., FERGUSON, J.G., Jr., EL NAYAL, Z.M., EL NAHAS, E.H.E., and BERNARD, R.P. Three-center study on incomplete abortions in Khartoum, Sudan: a preliminary report. Presented at the 4th Congress of Obstetrics and Gynaecology, Khartoum, Democratic Republic of Sudan, Africa, February 10-13, 1975. Chapel Hill, North Carolina, International Fertility Research Program, 1975. 30 p.

411. RUSSELL, K.P. Shock and shocklike states. In: Danforth, D.N., ed. Obstetrics and gynecology. 3rd ed. Hagerstown, Maryland, Harper and Row, 1977. p. 684-690.

412. SACHS, F.L., LANDSBERG, L., and BROOTEN, P. Medical grand rounds at Yale-New Haven Hospital: septic abortion. [Comments by John McClain Mortis.] Connecticut Medicine 34(9): 652-653. September 1970.

•413. SAI, F.T., ed. A strategy for abortion management: report of an IPPF Africa Regional Workshop. London, International Planned Parenthood Federation, December 1978. 172 p.

414. SAI, F.T. Sub-Saharan Black Africa. In: David, H.P. Abortion research: international experience. Lexington, Massachusetts, D.C. Heath, 1974. p. 243-249.

415. SAMBHI, J.S. Abortion by massage: "bomoh." IPPF Medical Bulletin 11(1): 3. February 1977.

416. SAMPOERNO, D. and SADLI, S. Indonesia. In: Family Planning Association of Nepal. and Transnational Family Research Program. Psychosocial aspects of abortion in Asia. (Proceedings of the Asian Regional Research Seminar on Psychosocial Aspects of Abortion, Kathmandu, Nepal, November 26-29, 1974) Washington, D.C., American Institutes for Research, [1975]. p. 21-28.

417. SANTAMARIA P., L.E. Aborto provocado, en el Instituto Materno Infantil. [Induced abortion in the Maternal Child Institute.] [SP] Revista Colombiana de Obstetricia y Ginecologia 21(2): 137-139. March-April 1970.

418. SANTAMARINA, B.A.G. and SMITH, S.A. Septic abortion and septic shock. Clinical Obstetrics and Gynecology 13(2): 291-304. June 1970.

•419. SANTEE, B. Abortion in Brazil. New York, Columbia University, Center for Population and Family Health, National Institute for the Study of Human Reproduction, April 1976. 35 p.

420. SANTEE, B. [International Planned Parenthood Federation] [Illegal abortion in Latin America] Personal communication, May 19, 1980.

421. SANTEE, B. Infant and maternal mortality under Allende's socialism. May 5, 1974. 26 p. (Unpublished)

422. SANTEE, B. A prospective abortion study in Santiago, Chile. In: Pan American Health Organization [PAHO], and Transnational Family Research Institute. Epidemiology of abortion and practices of fertility regulation in Latin America: selected reports. Washington, D.C., PAHO, 1975. (Scientific Publication No. 306) p. 30-38.

423. SARGENT, C. [Southern Methodist University] [Illegal abortion in Benin] Personal communication, October 15, 1979.

424. SCHNEIDER, D.M. Abortion and depopulation on a Pacific island. In: Paul, B.D., ed. Health, culture and community. New York, Russell Sage Foundation, 1955. p. 211-235.

425. SCHUMER, W. Steroids in the treatment of clinical septic shock. Annals of Surgery 184(3): 333-341. September 1976.

•426. SCHWARZ, R.H. Septic abortion. Philadelphia, Pennsylvania, J.B. Lippincott, 1968. p. 1-22, 55-153.

427. SCHWARZ, R.H. Septic abortion: personal experience and management. Antibiotics and Chemotherapy 21: 46-49. 1976.

428. SCHWARZ, R.H. and AVIADO, D.M. Drug action, reaction, and interaction. 3. Dopamine for endotoxic shock. Journal of Clinical Pharmacology 16(2-3): 88-98. February-March 1976.

429. SCHWARZ, R.H. and EMICH, J.P., Jr. Endotoxin shock in abortion. Pennsylvania Medical Journal 68(12): 39-44. December 1965.

430. SCHWARZ, R.H. and GIBBS, R.S. Post-abortal infection: new approaches to an old problem. Journal of Obstetrics and Gynecological Nursing, September-October 1973. p. 62-65.

431. SCHWYHART, W.R. and KUTNER, S.J. A reanalysis of female reactions to contraceptive sterilizations. Journal of Nervous and Mental Disease 156(5): 354-370. 1973.

432. SCRIMSHAW, S. Culture, environment, and family size: a study of urban in-migrants in Guayaquil, Ecuador. Doctoral dissertation, Columbia University, 1974. p. 83-87, 125.

433. SELSTAD, G.M., EVANS, J.R., and WELCHER, W.H. Predicting contraceptive use in postabortion patients. American Journal of Public Health 65(7): 708-713. July 1975.

434. SEMIONO, C.P. [Kilimanjaro Christian Hospital, Moshi, Tanzania] [Illegal abortion in Tanzania] Personal communication, October 5, 1979.

435. SEN, N.K. and BANERJEE, S.K. Haematuria and haemoglobinuria in induced septic abortions: report of 3 cases. Journal of Obstetrics and Gynaecology of India 26(5): 647-651. October 1976.

436. SENGUPTA, B.S., GAJRAJ, M.K., and WYNTER, H.H. Outpatient therapeutic termination of pregnancy at the University Hospital of the West Indies. West Indian Medical Journal 26(3): 157-163. September 1977.

437. SEWARD, P.N., BALLARD, C.A., and ULENE, A.L. The effect of legal abortion on the rate of septic abortion at a large county hospital. American Journal of Obstetrics and Gynecology 115(3): 335-338. February 1, 1973.

438. SHARMA, B.P. Nepal. In: Family Planning Association of Nepal. and Transnational Family Research Program. Psychosocial aspects of abortion in Asia. (Proceedings of the Asian Regional Research Seminar on Psychosocial Aspects of Abortion, Kathmandu, Nepal, November 26-29, 1974) Washington, D.C., American Institutes for Research, [1975]. p. 63-67.

439. SHEDLIN, M.G. and HOLLERBACH, P.A. Modern and traditional fertility regulation in a Mexican community: factors in the process of decision making. New York, Population Council, 1978. 43 p.

440. SHEPARD, M.K. Female contraceptive sterilization. Obstetrical and Gynecological Survey 29(11): 739-787. November 1974.

441. SHEVASUNT, S., HOGAN, D.P., and THAITHONG, K. Fertility and family planning in rural northern Thailand. Studies in Family Planning 9(8): 212-221. August 1978.

442. SHINAGAWA, S. and NAGAYAMA, M. Cervical pregnancy as a possible sequela of induced abortion: report of 19 cases. American Journal of Obstetrics and Gynecology 105(2): 282-284. 1969.

443. SHUBIN, H. and WEIL, M.H. Bacterial shock. Journal of the American Medical Association 235(4): 421-424. January 26, 1976.

444. SHUBIN, H. and WEIL, M.H. Bacterial shock: a serious complication in urological practice. Journal of the American Medical Association 185(11): 850-853. September 14, 1963.

445. SHULMAN, J.J. and MERRITT, C.G. Postpartum contraception: subsequent pregnancy, delivery, and abortion rates. Fertility and Sterility 27(1): 97-103. January 1976.

446. SIKDAR, K. and KONAR, M. Trends of maternal mortality in Eden Hospital during 1976. Journal of the Association of Medical Women in India 69(2): 50-55. May-August 1979.

447. SILVEIRA, M.H. Abortamento espontâneo e provacado: estudo epidemiológico. [Spontaneous and provoked abortion: an epidemiological study.] [PT] Femina 4(4): 215-216, 218-219, 221-222. April 1976.

448. SIMPSON-HEBERT, M., PIOTROW, P.T., CHRISTIE, L.J., and STREICH, J. Traditional midwives and family planning. Population Reports, Series J, No. 22. Population Information Program, May 1980. 51 p.

•449. SINNATHURAY, T.A., YUSOF, K., FONG, T.N.K., PALAN, V.T., PATHMANATHAN, I., and ANN, T.B. Report on maternal health and early pregnancy wastage in Peninsular Malaysia. Kuala Lumpur, Malaysia, Federation of Family Planning Associations, 1977. (International Development Research Centre Grant No. 3-72-103) 166 p.

450. SINNATHURAY, T.A., YUSOF, K., PALAN, V.T., FONG, C.K., ADEEP, N., CHONG, C.H., and YIP, Y.C. Acute pelvic inflammatory disease pattern in abortion-related hospital admissions. Presented at the International Symposium on Pelvic Inflammatory Disease, Center for Disease Control, Atlanta, Georgia, April 1-3, 1980. 27 p.

451. SIWALE, S.H. View from Africa: Zambia. In: Bogue, D.J., Oettinger, K., Thompson, M., and Morse, P., eds. Adolescent fertility. (Proceedings of the 1st Inter-Hemispheric Conference on Adolescent Fertility, Airlie, Virginia, August 31-September 4, 1976) Chicago, Illinois, University of Chicago, Community and Family Study Center, 1977. p. 39-40.

452. SKOUBY, S.O. IUD ved abortus provocatus. [IUD after induced abortion.] [DA] Ugeskrift for Laeger 138(6): 339-341. February 2, 1976.

453. SOGOLOW, S.R. Vaginal tubal ligation at time of vacuum curettage for abortion. Obstetrics and Gynecology 38(6): 888-892. December 1971.

454. SOLHEIM, F. and RYDNERT, J. Vacuum aspiration at therapeutic abortion: effect of Cu-IUD insertion at operation on post-operative blood loss. Contraception 13(6): 707-713. June 1976.

455. SOSKICE, D.W. and TRUSSELL, J.J. Effects of the Abortion Act. British Journal of Hospital Medicine, March 1973. p. 299-302.

456. SPEROFF, L. Bacterial shock in obstetrics and gynecology: with emphasis on the surgical management of septic abortion. American Journal of Obstetrics and Gynecology 95(1): 139-151. May 1, 1966.

457. SPRING, A. An indigenous therapeutic style and its consequences for natality: the Luvale of Zambia. In: Marshall, J.F. and Polgar, S., eds. Culture, natality, and family planning. Chapel Hill, North Carolina, Carolina Population Center, 1976. (Carolina Population Center Monograph No. 21) p. 99-125.

458. STANDER, H.J. Williams obstetrics. 8th ed. New York, Appleton-Century-Crofts, 1941. 1401 p.

459. STATE UNIVERSITY OF NEW YORK. DOWNSTATE MEDICAL CENTER. DEPARTMENT OF OBSTETRICS AND GYNECOLOGY. House Staff procedures book. [1980]. p. 46-48. (Unpublished)

460. STEPTOE, P.C. [Laparoscopic sterilization during termination of pregnancy.] Proceedings of the Royal Society of Medicine 62: 833-834. August 1969.

461. STEVENSON, C.S. Septic abortion with or without septic shock: diagnosis and treatment. Journal of the Michigan State Medical Society 63(1): 37-40. January 1964.

462. STEWART, G.K. and GOLDSTEIN, P. Medical and surgical complications of therapeutic abortions. Obstetrics and Gynecology 40(4): 539-550. October 1972.

463. STUBBLEFIELD, P.G. Current technology for abortion. Current Problems in Obstetrics and Gynecology 2(4): 3-44. December 1978.

•464. SU, I.H. Study on the impact of reform of abortion law in Taiwan, Republic of China. Doctoral dissertation, Johns Hopkins University, School of Hygiene and Public Health, September 1975. 312 p.

465. SU, I.H. and CHOW, L.P. Induced abortion and contraceptive practice: an experience in Taiwan. Studies in Family Planning 7(8): 224-230. August 1976.

466. SULIMAN, N.H. Abortion in Egypt. Population Studies, No. 49. April-June 1979. p. 14-15.

467. SULLIVAN, J.M., SU, K.H., and LIU, T.H. The influence of induced abortion on Taiwanese fertility. Studies in Family Planning 7(8): 231-238. August 1976.

468. SÜMBÜLOGLU, K., BERTRAN, M., and FISEK, N.H. Ankara. In: Omran, A.R. and Standley, C.C., eds. Family formation patterns and health: an international collaborative study in India, Iran, Lebanon, Philippines, and Turkey. Geneva, Switzerland, World Health Organization, 1976. p. 183-199.

469. SUN, T.-H., LIN, H.-S., and FREEDMAN, R. Trends in fertility, family size preferences, and family planning practice: Taiwan, 1961-76. Studies in Family Planning 9(4): 54-70. April 1978.

470. TALIADOROS, D.M. Induced abortion in Cyprus. In: Nazer, I.R., ed. Induced abortion: a hazard to public health? (Proceedings of the 1st Conference of the IPPF Middle East and North Africa Region, Beirut, Lebanon, February 1971) Beirut, Lebanon, International Planned Parenthood Federation, 1972. p. 179-181.

471. TAN, S.B. The psychosocial aspects of abortion in Singapore. Ottawa, Canada, International Development Research Centre, [1978]. 412 p.

472. TATUM, H.J. Intrauterine contraception. American Journal of Obstetrics and Gynecology 112(7): 1000-1021. April 1, 1972.

473. TAUSSIG. F.J. Historical and racial aspects. In: Taussig, F.J. Abortion: spontaneous and induced: medical and social aspects. St. Louis, Missouri, C.V. Mosby, 1936. p. 31-45.

474. TEZCAN, S. A comparative study of induced abortion in Turkey using the randomizing response technique versus direct questioning. Doctoral dissertation, University of North Carolina, 1977. 207 p.

475. TEZCAN, S. [Health problems of Turkish women.] [TU] In: Abadan-Unat, N., ed. [The woman in Turkish society.] [TU] Ankara, Turkey, Turkish Social Science Association, 1979. p. 73-78.

476. TEZCAN, S. [Hacettepe University, Ankara, Turkey] [Illegal abortion in Turkey] Personal communication, February 19, 1980. 2 p.

•477. TEZCAN, S., CARPENTER-YAMAN, C.E., and FISEK, N.H. Abortion in Turkey. Ankara, Turkey, Hacettepe University, Institute of Community Medicine, 1980. 78 p.

•478. THAILAND. NATIONAL FAMILY PLANNING PROGRAM. RESEARCH AND EVALUATION UNIT. Rural abortion in Thailand: a national survey of practitioners. Thailand, National Family Planning Program, January 1979. 50 p.

479. THAMBU, J.A.M. Abortions: government hospitals, Peninsular Malaysia, 1960-1972. Medical Journal of Malaysia 29(4): 258-262. June 1975.

480. THAMBU, J.A.M. and MARZUKI, A. The problem of septic and criminal abortion. March 1971. 5 p. (Unpublished)

481. THOMPSON, B. and BAIRD, D. Follow-up of 186 sterilized women. Lancet 1: 1023-1027. May 11, 1968.

482. TIETZE, C. [Population Council] [Illegal abortion] Personal communication, May 9, 1980.

•483. TIETZE, C. Induced abortion: 1979. 3rd ed. New York, Population Council, 1979. (A Population Council Fact Book) 108 p.

484. TIETZE, C. Maternal mortality excluding abortion mortality. [EN, FR] World Health Statistics Report 30(4): 312-339. 1977.

485. TIETZE, C., BONGAARTS, J., and SCHEARER, B. Mortality associated with the control of fertility. Family Planning Perspectives 8(1): 6-14. January-February 1976.

•486. TIETZE, C. and LEWIT, S. Joint Program for the Study of Abortion (JPSA): early medical complications of legal abortion. Studies in Family Planning 3(6): 97-122. June 1972.

487. TIMONEN, H. and LUUKKAINEN, T. Immediate postabortion insertion of the Copper-T (TCu-200) with eighteen months follow-up. Contraception 9(2): 153-160. February 1974.

488. TOPPOZADA, H.K. and TOPPOZADA, M.K. Induced abortion: a comparison of its incidence and hazards with those of spontaneous abortion in private practice in Alexandria. In: Nazer, I.R., ed. Induced abortion: a hazard to public health? (Proceedings of the 1st Conference of the IPPF Middle East and North Africa Region, Beirut, Lebanon, February 1971) Beirut, Lebanon, International Planned Parenthood Federation, 1972. p. 168-177.

489. TREVOR, J. Family change in Sokoto: a traditional Moslem Fulani/Hausa city. In: Caldwell, J.C., ed. Population growth and socioeconomic change in West Africa. New York, Columbia University Press, 1975. p. 236-253.

490. TRIAS, M. Impacto y efectos secundarios de la anticoncepcion. [The impact and the secondary effects of contraception.] [SP] Bogotá, Colombia, Profamilia, [1977]. 36 p.

491. TRUSSELL, R.R. Pelvic inflammatory disease. Proceedings of the Royal Society of Medicine 61: 365-368. April 1968.

492. TSAFRIR, J.S. Pregnancy and abortion in adolescence in developing countries. Presented at the WHO Meeting on Pregnancy and Abortion in Adolescence, Geneva, Switzerland, June 24-28, 1974. 19 p.

493. TWUMASI, P.A. [University of Ghana, Accra] [Illegal abortion in Ghana] Personal communication, October 24, 1979.

494. TYRER, L. Postabortal use of oral contraceptives. In: Holtrop, H.R., Waife, R.S., Bustamente, W., and Rizo, A., eds. New developments in fertility regulation: (A conference for Latin American physicians, Airlie House, Airlie, Virginia, March 28-30, 1976) Chestnut Hill, Massachusetts, Pathfinder Fund, 1976. p. 177-181.

495. UDO, R.K. Migration and urbanization in Nigeria. In: Caldwell, J.C., ed. Population growth and socio-economic change in West Africa. New York, Columbia University Press, 1975. p. 298-307.

496. UNITED NATIONS [UN] DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS. STATISTICAL OFFICE. Demographic yearbook 1974. Special topic: mortality statistics. 26th ed. [EN, FR] New York, UN, 1975. (ST/ESA/STAT/SER.R/3) 1109 p.

497. UNITED NATIONS [UN]. DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS. STATISTICAL OFFICE. Demographic yearbook 1975. Special topic: natality statistics. 27th ed. [EN, FR] New York, UN, 1976. (ST/ESA/STAT/SER.R/4) 1118 p.

498. UNITED NATIONS [UN]. DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS. STATISTICAL OFFICE. Demographic yearbook 1976. Special topic: marriage and divorce statistics. 28th ed. [EN, FR] New York, UN, 1977. (ST/ESA/STAT/SER.R/4) 984 p.

499. UNITED NATIONS [UN]. DEPARTMENT OF INTERNATIONAL ECONOMIC AND SOCIAL AFFAIRS. STATISTICAL OFFICE. Demographic yearbook 1977. Special topic: international migration statistics. 29th ed. [EN, FR] New York, UN, 1978. (St/ESA/STAT/SER.R/6) 1024 p.

500. UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION [UNESCO]. Statistical yearbook 1977. [EN, FR, SP] Paris, UNESCO, 1978. 1064 p.

•501. UNITED NATIONS FUND FOR POPULATION ACTIVITIES [UNFPA]. Survey of laws on fertility control: country profiles. New York, UNFPA, 1979. 98 p.

502. UNITED STATES. CENTER FOR DISEASE CONTROL [CDC]. FAMILY PLANNING EVALUATION DIVISION. Abortion surveillance 1977. Atlanta, Georgia, CDC, September 1979. 62 p.

503. UNITED STATES. DEPARTMENT OF COMMERCE. BUREAU OF THE CENSUS. Chile. Washington, D.C., U.S. Government Printing Office, February 1978. (Country Demographic Profiles No. 13; ISP-DP-13) 20 p.

504. UNITED STATES. DEPARTMENT OF COMMERCE. BUREAU OF THE CENSUS. Mexico. Washington, D.C., U.S. Government Printing Office, September 1979. (Country Demographic Profiles ISP-DP-14) 34 p.

505. UNITED STATES. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. FOOD AND DRUG ADMINISTRATION. Intrauterine contraceptive devices: professional and patient labeling. Federal Register 42(90): 23772-23783. May 10, 1977.

506. UNITED STATES. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE [DHEW]. NATIONAL CENTER FOR HEALTH STATISTICS. Detailed diagnoses and surgical procedures for patients discharged from short-stay hospitals: United States, 1977. Hyattsville, Maryland, DHEW, September 1979. p. 135.

507. UNITED STATES. SUPREME COURT. *Doe* v. *Bolton*. 410 United States Reports 179 (U.S. Supreme Court 1979).

508. UNITED STATES. SUPREME COURT. *Roe* v. *Wade*, 410 United States Reports 113 (U.S. Supreme Court 1973).

509. VALENZUELA, A.B. Abortion in Filipino women. Presented at the 3rd Conference on Population, Manila, Philippines, December 11-12, 1969. 11 p.

510. VALLE, R., GARRIDO, J., BOCAZ, J.A., and TAFEL, K. Shock endotoxico en obstetricia. [Endotoxic shock in obstetrics.] [SP] Revista Chilena de Obstetricia y Ginecologia 41(3): 158-165. 1976.

511. VALLET, L.J. Workings of abortion law in Mauritius. In: Sai, F.T., ed. A strategy for abortion management: report of an IPPF Africa Regional Workshop. London, International Planned Parenthood Federation, December 1978. p. 92-106.

512. VELEZ RAMIREZ, O. 1.229 casos de aborto en el Hospital Universitario de Caldas. [1.229 cases of abortion in the Caldas University Hospital.] [SP] Revista Colombiana de Obstetricia y Ginecologia 21: 147-170. March-April 1970.

513. VIADA, R., EYZAGUIRRE, H., FUENTES, F., MILLER, E.R., and GOLDSMITH, A. Aborto en Santiago aspectos médicos y sociodemográficos. [Medical and socio-demographic implications of abortion at Felix Bulnes Hospital in Santiago.] [SP] Reproduccion 3(1-2): 33-42. January-June 1976.

°514. VIEL, B. The demographic explosion: the Latin American experience. New York, Irvington, 1976. 249 p.

515. VIEL, B. The health consequences of illegal abortion in Latin America. In: Zatuchni, G.I., Sciarra, J.J., and Speidel, J.J., eds. Pregnancy termination: procedures, safety, and new developments. (Proceedings of a workshop and postgraduate course, Nassau, Bahamas, May 23-26, 1978) Hagerstown, Maryland, Harper and Row, 1979. (PARFR Series on Fertility Regulation) p. 353-360.

516. VIEL, B. Patterns of induced abortion in Chile and selected other Latin American countries. In: Pan American Health Organization [PAHO], and Transnational Family Research Institute. Epidemiology of abortion and practice of fertility regulation in Latin America: selected reports. Washington, D.C., PAHO, 1975. (Scientific Publication No. 306) p. 1-18.

517. VIEL, B. Results of a family planning program in the western area of the city of Santiago. American Journal of Public Health 59(10): 1898-1909. October 1969.

518. VIEL, B. The sequelae of nonhospital abortions. In: Hall, R.E., ed. Abortion in a changing world. Vol. 1. (Proceedings of an International Conference, Hot Springs, Virginia, November 17-20, 1968) New York, Columbia University Press, 1970. p. 226-242.

519. VIEL, B. and LUCERO, S. An analysis of 3 years' experience with intrauterine devices among women in the western area of the city of Santiago, July 1, 1964, to June 30, 1967. American Journal of Obstetrics and Gynecology 106(5): 765-775. March 1, 1970.

520. WAIFE, R.S. Traditional methods of birth control in Zaire. Chestnut Hill, Massachusetts, Pathfinder Fund, December 1978. 19 p.

521. WALLACE, W. [Johns Hopkins University] [Abortion in Tunisia] Personal communication, February 4, 1980.

522. WARNER, S.L. Randomized response: a survey technique for eliminating evasive answer bias. Journal of the American Statistical Association 60(309): 63-69. March 1965.

523. WARREN, D. [Iowa State University, Department of Anthropology] [Abortion in Africa] Personal communication, October 22, 1979.

524. WEIL, M.H., SHUBIN, H., and NISHIJIMA, H. Gram-negative shock: definition, diagnosis and mechanisms. Antibiotics and Chemotherapy 21: 178-183. 1976.

525. WEINSTEIN, A.J. Treatment of bacterial infections in pregnancy. Drugs 17(1): 56-65. 1979.

526. WESTINGHOUSE HEALTH SYSTEMS. Mexico: Contraceptive Prevalence Survey: summary report. Columbia, Maryland, Westinghouse Health Systems, October 1978. (Contract AID-pha-C-1194) 10 p.

527. WHITE, M.K., ORY, H.W., ROOKS, J.B., and ROCHAT, R.W. Intrauterine device termination rates and the menstrual cycle day of insertion. Obstetrics and Gynecology 55(2): 220-224. February 1980.

528. WHITE, M.K., ROOKS, J.B., STRAUSS, L., ROCHAT, R.W., TYLER, C.W., Jr., and SENANAYAKE, P. Current practice concerning time of IUD insertion. IPPF Medical Bulletin 11(6): 1-3. December 1977.

529. WIDDICOMBE, J. [Reproductive Health Services, St. Louis, Missouri] [Managment of septic abortion in Bangladesh] Personal communication, November 7, 1979.

530. WILSON, R.F., SIBBALD, W.J., and JAANIMAGI, J.L. Hemodynamic effects of dopamine in critically ill septic patients. Journal of Surgical Research 20(3): 163-172. March 1976.

531. WORLD HEALTH ORGANIZATION [WHO]. Female sterilization: guidelines for the development of services. Geneva, Switzerland, WHO, 1976. (WHO Offset Publication No. 26) 27 p.

532. WORLD HEALTH ORGANIZATION [WHO]. Spontaneous and induced abortion: report of a WHO scientific group. Geneva, Switzerland, WHO, 1970. (WHO Technical Report No. 461) 51 p.

533. WORLD HEALTH ORGANIZATION [WHO]. World health statistics annual. Vol. 1. Vital statistics and causes of death. Geneva, Switzerland, WHO, 1965.

534. WORLD HEALTH ORGANIZATION [WHO]. World health statistics annual. Vol 1. Vital statistics and causes of death. Geneva, Switzerland, WHO, 1967.

535. WORLD HEALTH ORGANIZATION [WHO]. World health statistics 1978. Vol. 3. Geneva, Switzerland, WHO, 1979. 84 p.

•536. WORLD HEALTH ORGANIZATION [WHO]. SCIENTIFIC GROUP. Induced abortion. Geneva, Switzerland, WHO, 1978. (Technical Report Series No. 623) 65 p.

537. WORLD HEALTH ORGANIZATION TASK FORCE ON SEQUELAE OF ABORTION SUBSECTION ON THE HEALTH AND HEALTH SERVICE IMPACT OF ILLEGAL ABORTION. Health and economic effects of illegal abortion: preliminary findings from an international study. In: Zatuchni, G.I., Sciarra, J.J., and Speidel, J.J., eds. Pregnancy termination: procedures, safety, and new developments. (Proceedings of a workshop and postgraduate course, Nassau, Bahamas, May 23-26, 1978) Hagerstown, Maryland, Harper and Row, 1979. (PARFR Series on Fertility Regulation) p. 361-369.

538. WORLD HEALTH ORGANIZATION TASK FORCE ON THE SEQUELAE OF ABORTION. The association of induced abortion with adverse outcome in the subsequent pregnancy. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Risks, benefits and controversies in fertility control. (Proceedings of the workshop, Arlington, Virginia, March 13-16, 1977) Hagerstown, Maryland, Harper and Row, 1978. (PARFR Series on Fertility Regulation) p. 368-389.

539. WRIGHT, C.S.W., CAMPBELL, S., and BEAZLEY, J. Second-trimester abortion after vaginal termination of pregnancy. Lancet 1(7763): 1278-1279. June 10, 1972.

540. YAUKEY, D. Fertility differences in a modernizing country: a survey of Lebanese couples. Princeton, New Jersey, Princeton University Press, 1961. 205 p.

541. YUZPE, A.A. and RIOUX, J.E. Pregnancy termination combined with sterilization. In: Zatuchni, G.I., Sciarra, J.J., and Speidel, J.J., eds. Pregnancy termination: procedures, safety, and new developments. (Proceedings of a workshop and postgraduate course, Nassau, Bahamas, May 23-26, 1978) Hagerstown, Maryland, Harper and Row, 1979. (PARFR Series on Fertility Regulation) p. 312-322.

542. ZELNIK, M. Second pregnancies to premaritally pregnant teenagers, 1976 and 1971. Family Planning Perspectives 12(2): 69-76. March-April 1980.

543. ZELNIK, M. and KANTNER, J.F. Contraceptive patterns and premarital pregnancy among women aged 15-19 in 1976. Family Planning Perspectives 10(3): 135-142. May-June 1978.

544. ZIMMERMAN, M. Abortion law and practice: a status report. Population Reports, Series E, No. 3. Population Information Program, March 1976. 16 p.

545. ZIPPER, J. Chilean experience with IUDs: updating the programme. In: Hefnawi, F. and Segal, S.J., eds. Analysis of intrauterine contraception. (Proceedings of the 3rd International Conference on Intrauterine Contraception, Cairo, Egypt, December 12-14, 1974) Amsterdam, Netherlands, North-Holland, 1975. p. 217-224.

546. ZRIBI, A. and NACEF, T. Tunisia. In: Bloch, L.S., ed. The physician and population change: a strategy for Africa, the Middle East and Europe. (Proceedings of a Tri-regional Seminar, Tunis, Tunisia, October 30-November 3, 1978) Bethesda, Maryland, World Federation for Medical Education, March 1979. p. 203-215.

ADDENDA

547. ALVARADO-DURAN, A. [Director, Centro Medico Nacional, Hospital de Gineco-Obstetricia] [Admissions for abortion and live births, 1970-1979] Personal communication to H. Davis [Johns Hopkins Program for International Education in Gynecology and Obstetrics], May 23, 1980. 2 p.

548. ALVARADO-DURAN, A. [Director, Centro Medico Nacional, Hospital de Gineco-Obstetricia] [Hospital protocol for treating septic abortion] Personal communication to H. Davis [Johns Hopkins Program for International Education in Gynecology and Obstetrics], May 23, 1980. 3 p.

549. ANONYMOUS. Repeated abortions increase risk of miscarriage, premature births and low-birth-weight babies. Family Planning Perspectives 11(1): 39-40. January-February 1979.

550. BARSY, G. and SARKANY, J. Impact of induced abortions on the birthrate and infant mortality. Demografia 6: 427. 1963.

551. BATSON, H.W.K. Incomplete early abortion. [1980]. 18 p. (Unpublished)

552. BERAL, V. An epidemiological study of recent trends in ectopic pregnancy. British Journal of Obstetrics and Gynaecology 82: 775. 1975.

553. BOGNAR, Z. and CZEIZEL, A. Mortality and morbidity associated with legal abortions in Hungary, 1960-1973. American Journal of Public Health 66(6): 568-575. June 1976.

554. BONNAR, J. Shock in pregnancy. In: Stallworthy, J. and Bourne, G., eds. Recent advances in obstetrics and gynaecology. No. 12. London, Churchill Livingstone, 1977. p. 317-337.

555. CHEN, P.-C. [Birth data, China] Personal communication, May 12, 1980. 3 p.

556. CHILE. MINISTERIO DE SALUD. Información básica en salud. [Basic information on health.] [SP, EN] [Santiago,] Chile, Ministerio de Salud, 1980. 13 p.

557. COLOMBIA. CORPORACION CENTRO REGIONAL DE POBLACION. DEPARTAMENTO ADMINISTRATIVO NACIONAL DE ESTADISTICA [DANE]. Encuesta nacional de fecundidad, Colombia, 1976: resultados generales. [National fertility survey, Colombia, 1976: general findings.] [SP] Bogotá, Colombia, DANE, September 1976. (World Fertility Survey) 491 p.

558. COLOMBIA. MINISTERIO DE SALUD. [Abortion and maternal mortality statistics.] [Tables] [SP] [Bogotá,] Colombia, Ministerio de Salud, [1980]. 10 p.

559. COLOMBIA. MINISTERIO DE SALUD. DEPARTAMENTO PLANIFICACION ESTADISTICA. [Health statistics.] [Tables] [SP] [Bogotá,] Colombia, Ministerio de Salud, Departamento Planificación Estadística, [1980]. 3 p.

560. COMAS, M.R., CUDDIHEE, R.E., and CAVANAGH, D. Acute renal failure. In: Danforth, D.N., ed. Obstetrics and gynecology. 3rd ed. Hagerstown, Maryland, Harper and Row, 1977. p. 485-492.

561. DALING, J.R. and EMANUEL, I. Induced abortion and subsequent outcome of pregnancy: a matched cohort study. Lancet 2(7926): 170-172. July 26, 1975.

562. DALING, J.R. and EMANUEL, I. Induced abortion and subsequent outcome of pregnancy in a series of American women. New England Journal of Medicine 297(23): 1241-1245. December 8, 1977.

563. FORGACS, P. Treatment of septic shock. Medical Clinics of North America 63(2): 465-471. March 1979.

564. HAHN, D.W. Pharmacologic contragestational agent. In: Zatuchni, G.I., Labbok, M., and Sciarra, J.J., eds. Research frontiers in fertility regulation. (Proceedings of the workshop, Mexico City, Mexico, February 11-14, 1980) Hagerstown, Maryland, Harper and Row, 1980. (PARFR Series on Fertility Regulation) In press.

565. HARLAP, S., SHIONO, P.H., RAMCHARAN, S., BERENDES, H., and PELLEGRIN, F. A prospective study of spontaneous fetal losses after induced abortions. New England Journal of Medicine 301(13): 677-681. September 27, 1979.

566. HATCHER, R.A., STEWART, G.K., STEWART, F., GUEST, F., SCHWARTZ, D.W., and JONES, S.A. Contraceptive technology 1980-1981. 10th ed. New York, Irvington, 1980. 270 p.

567. HOGUE, C.J. Low birthweight subsequent to induced abortion: a historical prospective study of 948 women in Skopja, Yugoslavia. America Journal of Obstetrics and Gynecology 123(7): 675-681. December 1, 1975.

568. KOETSAWANG, S. Annual statistics 2511-2518/1968-1975: illegal abortion. Bangkok, Thailand, Mahidol University, Siriraj Family Planning Research Unit, [1975]. 34 p.

569. KOETSAWANG, S. Annual statistics 2519/1976: abortion. Bangkok, Thailand, Mahidol University, Siriraj Family Planning Research Unit, [1976]. 50 p.

570. LEDGER, W.J. Tetracyclines in gynecologic infections. Bulletin of the New York Academy of Medicine 54(2): 196-204. February 1978.

571. LEVIN, A., SCHOENBAUM, S.C., MONSON, R.R., and RYAN, K.J. Induced abortion and the risk of spontaneous abortion. Presented at the 106th Annual Meeting of the American Public Health Association, Los Angeles, California, October 15-19, 1978. [Abstract]

572. LOZANO C., A., PERALTA A., M.T., REYES M., F., ALVARADO P., R., and SARAVIA, J. Morbi-mortalidad: clasificación y tratamiento del aborto septico. [Morbidity-mortality: classification and treatment of septic abortion.] [SP] [Bogotá,] Colombia, Universidad Nacional de Colombia, Facultad de Medicina, [1979]. 86 p.

573. LYLE, K.C. Planned birth in Tientsin, China. [1980]. 35 p. (To be published in China Quarterly)

574. LYLE, K.C., SEGAL, S.J., CHANG, C.-C., and CH'IEN, L.-C. Perinatal study in Tientsin, 1978. [1979]. 43 p. (To be published in International Journal of Gynaecology and Obstetrics)

575. MORRIS, L., ANDERSON, J.E., MONTEITH, R.S., KRISKOVICH, R., SCHOEMAKER, J., and FRUTOS, O. Contraceptive prevalence in Paraguay. Studies in Family Planning 9(10-11): 272-279. October-November 1978.

576. MOSTAFA, A.A. and BARAKAT, K.I. The abortion load in the Kuwait Maternity Hospital: five years' study. Journal of the Kuwait Medical Association 13(2): 93-95. June 1979.

577. NEUWIRTH, R.S. [Director of Obstetrics and Gynecology, St. Luke's Hospital Center, New York] [Bacteria in septic abortions] Personal communication, May 19, 1980. 1 p.

578. PANAMA. OFICINA DE ESTUDIOS DE POBLACION. Encuesta de fecundidad. Informe general. Panama, 1977. [Fertility survey. General report. Panama, 1977.] [SP] [Panama City,] Panama, November 1977. (World Fertility Survey) 485 p.

579. PANAYOTOU, P.P., KASKARELIS, D.B., MIETTINEN, O.S., TRICHOPOULOS, D.B., and KALANDIDI, A.K. Induced abortion and ectopic pregnancy. American Journal of Obstetrics and Gynecology 114(4): 507-510. 1972.

580. PAPAEVANGELOU, G., VRETTOS, A.S., PAPADATOS, C., and ALEXIOU, D. The effect of spontaneous and induced abortion on prematurity and birth-weight. Journal of Obstetrics and Gynaecology of the British Commonwealth 80(5): 418-422. May 1973.

581. PENTELAKIS, S.N., PAPADIMITRIOU, G.C., and DOXIADIS, S.A. Influence of induced and spontaneous abortions on the outcome of subsequent pregnancies. American Journal of Obstetrics and Gynecology 116(6): 799-805. July 15, 1973.

582. RINEHART, W. and PIOTROW, P.T. OCs: update on usage, safety, and side effects. Population Reports, Series A, No. 5. Population Information Program, January 1979. 56 p.

583. ROCHAT, R.W. [U.S. Center for Disease Control] [Illegal abortion] Personal communication, May 12, 1980.

584. ROHT, L.H. and AOYAMA, H. Induced abortion and its sequelae: prevalence and associations with the outcome of pregnancy. International Journal of Epidemiology 2(1): 103-113. Spring 1973.

585. ROHT, L.H., AOYAMA, H., LEINEN, C. The association of multiple induced abortions with subsequent prematurity and spontaneous abortion. Japanese Journal of Obstetrics and Gynecology 23: 3. 1977.

586. SANCHEZ-TORRES, F. El aborto ilegal, con particular referencia a America Latina. [Illegal abortion, with particular reference to Latin America.] [SP] Washington, D.C., Population Crisis Committee, 1980. 4 p. (Unpublished)

587. SAWAZAKI, C. and TANAKA, S. The relationship between artificial abortion and extrauterine pregnancy. In: Harmful effects of induced abortion. Tokyo, Family Planning Federation of Japan, 1966. p. 49-63.

588. STAMPAR, D. Istraživanje o pouzdanosti podataka o učestalosti nasilnih pobačaja. [An investigation concerning the reliability of data on the frequency of induced abortion.] [SC] Stanovnistvo 3-4(1-2): 273-277. 1973-1974.

589. TIETZE, C. Induced abortion: 1980. 4th ed. New York, Population Council, 1980. (A Population Council Fact Book) In press.

590. TIETZE, C. and LEWIT, S. Life risks associated with reversible methods of fertility regulation. Presented at the International Symposium on A Reappraisal of Fertility Control: Benefits vs. Risks, Montreal, Canada, September 12-13, 1978. 12 p.

591. TRICHOPOULOS, D., HANDANOS, N., DANEZIS, J., KALANDIDI, A., and KALAPOTHAKI, V. Induced abortion and secondary infertility. British Journal of Obstetrics and Gynaecology 83(8): 645-650. August 1976.

592. UNITED NATIONS [UN]. DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS. STATISTICAL OFFICE. Demographic yearbook 1968. Special topic: marriage and divorce statistics. 20th ed. [EN, FR] New York, UN, 1969. (E/F. 69. XIII. 1) 818 p.

593. UNITED NATIONS [UN]. DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS. STATISTICAL OFFICE. Demographic yearbook 1969. Special topic: natality statistics. 21st ed. [EN, FR] New York, UN, 1970. (E/F. 70. XIII. 1) 694 p.

594. UNITED NATIONS [UN]. DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS. STATISTICAL OFFICE. Demographic yearbook 1970. Special topic: population trends. 22nd ed. [EN, FR] New York, UN, 1971. (E/F. 71. XIII. 1) 830 p.

595. UNITED NATIONS [UN]. DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS. STATISTICAL OFFICE. Demographic yearbook 1972. Special topic: population census statistics 2. 24th ed. [EN, FR] New York, UN, 1973. (ST/STAT/SER.R/1) 664 p.

596. UNITED NATIONS [UN]. DEPARTMENT OF INTERNATIONAL ECONOMIC AND SOCIAL AFFAIRS. STATISTICAL OFFICE. Statistical yearbook 1977. 29th ed. [EN, FR] New York, UN, 1978. (ST/ESA/STAT/SER.S/5) 958 p.

597. WILLIAMS, B.E.O. Maternal mortality in Sierra Leone. Freetown, Sierra Leone, Ministry of Health, [1979]. 22 p.

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Population Reports

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FEMALE STERILIZATION

Population Information Program, The Johns Hopkins University, Hampton House, 624 North Broadway, Baltimore, Maryland 21205, USA

Reversing Female Sterilization

Summary. More than 60 million women rely on voluntary sterilization to control their fertility. As the number of women who are sterilized continues to increase, so does the potential demand for reversing the procedure when unforeseen events, such as the death of a child or taking a new spouse, make people change their minds. Only a very small proportion of sterilized women may ever want reversal, but, for these few, techniques of microsurgery and new, more reversible sterilization procedures offer hope that eventually many female sterilizations may be reversible.

Nevertheless, at present the odds on reversing female sterilization are not good. Using the delicate techniques of microsurgery, a handful of expert surgeons has achieved pregnancy rates after sterilization reversal of about 60 percent — double the rate of 20 years ago — but surgeons who are not successful rarely report any results. Even the experts operate only on good candidates for reversal — women who have been carefully screened on the basis of age, fertility, health, and the condition of their fallopian tubes before reversal is attempted. Probably only about one-fifth of all women sterilized by current techniques could have their sterilizations reversed. Reversal is still a long, difficult, and costly operation. Moreover, rates of ectopic (tubal) pregnancy after reversal procedures are about 10 times higher than normal. Given the barriers to successful reversal, women considering sterilization should be clearly informed that it is a permanent method of fertility control.

Basically, the surgical procedure of reversing female sterilization requires rejoining, or anastomosing, portions of the fallopian tube that have been damaged or severed by a prior operation. The tubes must be rejoined in such a way that sperm and ovum can progress in opposite directions through the tubes. After conception, the fertilized ovum must receive sustenance for early development and move into the uterus at the proper time for implantation.

Microsurgery for Reversing Sterilization

The procedures used today to reverse female sterilization are known as microsurgery. They usually consist of a combination of the following techniques:

- use of an operating microscope, magnifying head loupe, or optical visor
- electrocoagulation to minimize bleeding
- exact alignment of tubal segments
- use of fine, non-tissue-reactive suture material and fine needles
- special care not to leave particles of foreign matter in the operating field
- constant irrigation to keep tissues moist.

Microsurgical techniques minimize injury to delicate tissue in and around the fallopian tubes and help to insure that a clear passage within the tubes will exist for sperm and ovum transport. Although the use of optical magnification is not always essential, better vision has enabled surgeons to see more clearly the effect of previous surgery, to align the tubal segments more precisely, and to use accurately suture material and needles that are barely visible to the naked eye.

In addition to improved surgical techniques, an important reason for higher pregnancy rates is the fact that reversal procedures today are being reported by a few well-trained surgeons who perform a relatively large number of operations. Experience is critical to success; microsurgery cannot be well performed by a busy gynecologist who does only a few procedures.

Whether the surgeon's work will be followed by pregnancy, however, also depends greatly on the condition of the tubes before reversal is attempted. The more the tube has been damaged during sterilization, the less likely that the reversal procedure will succeed. Apparently, 3 to 4 cm of tube must remain to reach the ovary and to assure proper timing of fertilization and implantation.

More Reversible Sterilization

Some forms of sterilization are more reversible than others. The now popular technique of electrocautery, usually by laparoscope, destroys 4 cm or more of tube and is the most difficult to

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This issue of **Population Reports** was prepared by Alice Henry, Ward Rinehart, and Phyllis T. Piotrow, Ph.D., on the basis of published and unpublished materials, correspondence, and interviews. Gordon Fox and Joseph H. Maier provided research assistance. Comments and additional material are welcome.

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Phyllis T. Piotrow, Ph.D., Director; Ward Rinehart, Editor.

reverse. The Pomeroy ligation procedure, very widely used throughout the world, removes an average of 3 cm of tube and is less difficult to reverse. Newer sterilization methods — the ring and the clip — may prove to be more reversible, although surgical rejoining of the tube is still required. The clip may be the most reversible of currently used methods since it damages only one cm or less of tube, but reports still are few. Research on sterilization techniques that would do minimal damage to the tubes and would avoid any need for surgical rejoining of tubal segments continues. Such methods include pouches to cover the fimbria and plugs to block the tubes.

Program Issues

It is estimated that about one or two per thousand sterilized women, or about 100,000 women worldwide, may be candidates for reversal. In developed countries many women seeking reversal have remarried and want to start a new family; in developing countries women seeking reversal often have lost a child. Others did not realize that sterilization was permanent or did not have or exercise other choices for contraception.

Among those who want their fertility restored, some must be excluded because of age, ill health, or other fertility impairments. Others will not have sufficient lengths of tube for reversal. Still others, while eligible for reversal, will not be willing to take the risks associated with major abdominal surgery, performed under general anesthesia and lasting at least 2 hours, when the chances of a subsequent normal pregnancy are not certain.

Cost also limits the number of reversals. In the US reversing sterilization costs $4,000-5,000 in doctor's and hospital fees. Where national health services rather than individuals or insurance companies bear this cost, the expense is partly shifted from the patient to the public. In developing countries, where surgeons and surgical facilities as well as basic health resources are scarce, governments need to consider how these resources can best be allocated to serve public health needs: How much should be invested in providing sterilization reversals? How much in meeting other needs?

A further question is how reversal procedures should be provided. In contrast to contraceptive services, sterilization reversal appears to be better provided by a few highly specialized, well-equipped centers than by wide dissemination through local institutions.

Currently, microsurgical training and data-gathering centers have been established in 15 developing countries, with support from the US Agency for International Development (USAID), after surgeons were trained at The Johns Hopkins University. These reversal services and others that may be organized should not be a substitute for widespread availability of a variety of reversible contraceptives, but they can provide, for the few women who will want this service, more choice and help in managing fertility problems. **End of Summary**

BACKGROUND

The earliest operations for tubal repair, reported in the late 19th and early 20th centuries (98, 250, 267, 309), were salpingostomies (openings of the distal, or ovarian, end of the tube) and uterotubal implants (boring a hole in the uterus and suturing the tubal segment to the uterine wall). Both were first performed to correct tubal blockage at either end of the tubes resulting from disease. The first anastomosis of the central portion of the tubes — a procedure comparable to many sterilization reversals today — was performed in 1910 by S.L. Christian and E.L. Sanderson. In 1913 they reported that the woman was pregnant, but it is not known whether a live birth resulted (50).

Pregnancy rates following early procedures to repair diseased tubes were low. A review of the world's literature found that only 3 percent of 568 tubal procedures to restore fertility reported before 1936 had been followed by term pregnancies (321). A mid-1930s survey in the US reported that, of 711 salpingostomies and 197 uterotubal implantations, only 36 resulted in live births, for a live birth rate of 4 percent (114).

Even as late as the early 1950s, tubal repair operations were not frequently performed and live birth rates were at best 15 percent. In a mid-1950s survey of 4,910 mainly US physicians, about half the 734 respondents had ever operated on fallopian tubes, and only 11 percent had performed 10 or more procedures. After salpingostomy and uterotubal implantation, live birth rates were 15 and 9 percent, respectively, but after resection and anastomosis of the central portions of the tube, the live birth rate reported by surgeons who had performed 10 or more procedures was only 4 percent (286).

Early Reversal Procedures

The first efforts to rejoin tubal segments that had been deliberately severed began early in the 20th century using animals. In 1908 Raymond Pearl and Frank Surface removed about 10 cm of oviduct from a Barred Plymouth Rock pullet and then rejoined the incised ends, using a technique developed for blood vessels. The hen began laying eggs again about 4 months after the procedure and continued to lay with regularity (228).

The first explicit sterilization reversal performed on a woman involved an experimental sterilization procedure specifically intended to be reversible. In 1934 A.H. Aldridge described how he had "temporarily sterilized" a 26-year-old woman by burying the fimbrial ends of the fallopian tubes in the broad ligament. Five years later he dissected free the buried fimbria, and 29 months after the operation the woman delivered a healthy infant at term (11). The Aldridge sterilization procedure gained only limited popularity, however, because of a high rate of spontaneous reversal and unwanted pregnancy (81).

Between 1948 and 1968 reports on nine series of sterilization reversal procedures were published. Eight series were small, consisting of 10 cases or fewer and totaling 40 cases (see Table 1, Section A). Of the 40 reversals reported, 12 procedures, or 30 percent, were followed by live births. The single large series consisted of 52 women who, having been sterilized in Germany before or during World War II, had undergone reversal procedures after the war; only 3 (6 percent) had become pregnant (308). In these nine series the criteria for selecting patients and details concerning technique were for the most part unreported. Generally, however, the surgeons used conventional techniques, including catgut or silk sutures, and did not employ any optical magnification.

Emphasis on gentle handling of tissues during surgery began in the 1950s. Louis Hellman, for one, noted in 1951 that the "use of heavy suture material and large needles can all damage the tubal mucosa sufficiently to cause hemorrhage and subsequent adhesions" (123). (Adhesions are fibrinous growths that can kink the tubes and interfere with passage of the ovum; see p. C-110). Hellman recommended, among other improvements, use of atraumatic needles, fine, 5-0 catgut or arterial silk sutures, and, as splint material, inert polyethylene tubing (123). Other important early contributors to the development of concepts and techniques of tubal surgery were V.N. Shirodkar of India, Raoul Palmer of France, and V.B. Green-Armytage of the United Kingdom (112, 113, 218, 276, 277).

During the 1960s gynecologists began to use magnification instruments, including microscopes, for tubal reconstruction. This type of equipment was first used in fields that require work on very delicate structures such as ears, eyes, blood vessels, and the brain (168). The use of an operating microscope for tubal surgery was first reported by Wolfgang Walz of the Federal Republic of Germany, in 1959 (323). In 1967 Kurt Swolin of Sweden pioneered in the use of magnifying glasses and an operating microscope to aid in operations on tubes of infertile women. Among the techniques he recommended to prevent tissue damage were careful hemostasis and keeping tissues moist during the procedure (303). In 1969 Celso-Ramon García of the US described layer-by-layer microsurgical anastomosis of the fallopian tubes of four women (99). In the same year A. David, B.G. Brackett, and García reported using an operating microscope and microsurgical techniques to remove the uterotubal junction of a rabbit (70); in 1974 Peter Paterson and Carl Wood of Australia and R.M.L. Winston of the United Kingdom independently reported using microscopes for surgery on rabbit oviducts (223, 346).

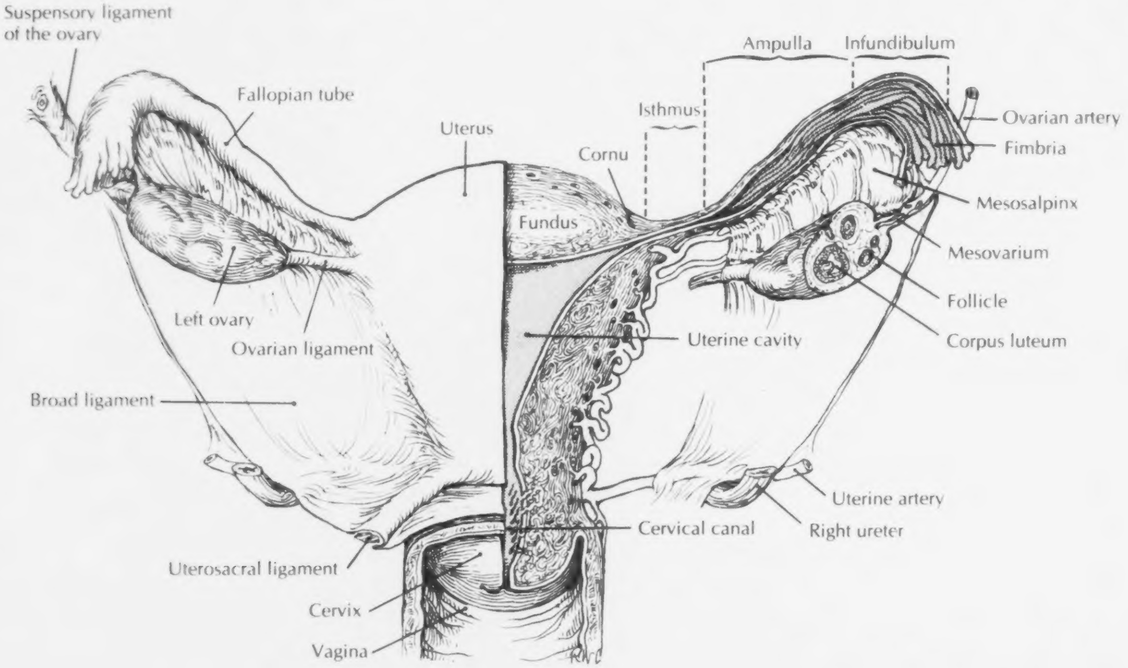

Figure 1. Posterior view of the female reproductive tract. On the left side, the ligaments supporting the uterus, fallopian tube, and ovary can be seen. On the right side, the uterus and adjoining organs have been cut away to show the blood supply and internal structure.

Starting in the late 1960s and early 1970s, more gynecologic surgeons began using microscopes while operating on women, although their first reports did not appear for several years. Victor Gomel of Canada reported using a microscope on patients in a series that began in 1970 (106), and Edward Diamond of the US, in a series beginning in 1972 (73).

Responding to this new interest in reversal procedures, gynecologists are now reporting in greater numbers on procedures performed over the preceding years, both with and without magnification and both with and without gentle tissue handling and fine sutures. In 18 recent series totaling 560 cases in which magnification was used, 56 percent of women had live births. This is a higher proportion than reported in three series totaling 88 cases in which gentle tissue handling was employed without magnification, resulting in a live birth rate of 48 percent. Both these rates are higher than in 10 series totaling 111 cases in which neither magnification nor gentle tissue handling were reported, resulting in a live birth rate of 30 percent (see Table 1, Sections B, C and D).

Thus, while the earliest tubal operations, intended to restore tubes damaged by disease, had low success rates, within the last few decades tubal surgery, employed to reverse female sterilization, has improved markedly. As Table 1 shows, the proportion of procedures followed by live births is now almost 60 percent. At the same time, rates of ectopic pregnancy have fallen. The improved rates now being reported by experienced surgeons reflect the adoption of magnification during surgery and of atraumatic tissue handling techniques. They also reflect more selectivity in the choice of candidates for reversal.

FACTORS INFLUENCING REVERSIBILITY

Three types of factors affect the chances for successful reversal of female sterilization:

- the woman's general and reproductive health
- the effect of the sterilization procedure on the tubes

Table 1. Pregnancy Outcomes Following Reversal of Female Sterilization, by Period, Surgical Technique, and Use of Magnification, Selected Studies, 1948-1980

Author & Date	Ref. No.	Country	Dates of Series	No. of Cases	% of Women Experiencing Outcome: Live Birth	Abortion	Ectopic Pregnancy	Ectopic/All Reported Pregnancies (%)
A. EARLY SERIES, NO MAGNIFICATION, CONVENTIONAL TECHNIQUES								
Cordua 1952	55	Federal Rep. of Germany	1946-?	7	29[a]	NA	NA	NA
Ekblad 1961	86	Sweden	NA	3	33[a]	NA	NA	NA
Hellman 1956	122	US	NA	3	33	0	0	0/4 (0)[b]
Milnor et al. 1950	197	US	1940-1948	3	67	NA	33	NA
Milochevitch 1968	198	Yugoslavia	NA	2	0	NA	NA	NA
Mutch 1959	202	US	1950-1957	10	30[a]	NA	NA	NA
Peel 1964	229	UK	NA	3	33[a]	NA	NA	NA
Schmidt-Elmendorff 1948	265	Federal Rep. of Germany	NA	9	22[a]	NA	NA	NA
Traenckner 1953	308	Federal Rep. of Germany	1944-1952	52	6[a]	2	6	3/7 (43)
Total				**92**	**16**	[c]	**7**	**3/11 (27)**
B. RECENT SERIES, NO MAGNIFICATION, CONVENTIONAL TECHNIQUES								
Anselmo 1977	17	Chile	NA	9	33	11	11[d]	1/6 (17)
Diamond 1977	74	US	1968-1971	12	25	17[e]		NA
Hodari et al. 1977	128	US	1972-1976	14	29[f]	0	21	3/7 (43)
Musich et al. 1977	201	US	1966-1976	3	67	NA	0	NA
Siegler & Perez 1975	288	US	1953-1973	23	22	0	4	1/6 (17)
Thatcher 1978	305	Australia	1974-1977	4	50	NA	NA	NA
Umezaki et al. 1974	311	US	1965-1972	6	50	NA	NA	NA
Vartan 1973	318	UK	NA	13	38	NA	NA	NA
Wheeless 1977	325	US	1968-1976	11	9[f]	0	0	0/1 (0)
Williams 1973	331	UK	1957-1972	16	25	13	0	0/4 (0)
Total				**111**	**30**	**4[g]**	**7[g]**	**5/24 (21)**
C. RECENT STUDIES, NO MAGNIFICATION, ATRAUMATIC TECHNIQUES								
McCormick et al. 1979	192	US	1967-1977	53	49[f]	0	15	8/34 (24)
Peterson et al. 1977	230	US	1973-1975	16	50[f]	0	0	0/8 (0)[h]
Rock et al. 1980	255	US	1940-1975	19	42	5	0	0/9 (0)[h]
Total				**88**	**48**	**1**	**9**	**8/51 (16)**

- the technique and surgical skill used to anastomose the tubes.

To assure that surgery is performed only on women who have a reasonable chance of term pregnancy after tubal anastomosis, those who request reversals are commonly screened both for health factors and for the effects of sterilization.

Screening

Careful screening is considered an important and integral first step in successful anastomosis — one of "the fundamental skills" of microsurgery (316). Surgeons commonly screen women for the following conditions or contraindications (68, 74, 107, 129, 233, 258, 282, 292, 299, 344):

- age over 37
- lack of regular ovulation
- health will be impaired by reversal procedure
- health will be impaired by pregnancy
- infertility of partner
- tubal disease
- insufficient tubal length.

Age is of course most readily assessed. Women over the age of 37 are considered poor risks for reversal because fertility decreases with age. Many surgeons recommend against reversals for these women (68, 129, 258, 299, 344). Winston has suggested that the prognosis for pregnancy is also poor if reversal is attempted more than 5 years after the sterilization procedure (338).

All women should undergo a basic fertility evaluation before a decision is made to attempt reconstructive tubal surgery. This should include a complete physical and fertility history and examination of the woman as well as recording of basal body temperature to confirm ovulation. At the same time, a medical history and physical examination should assure that neither abdominal surgery nor later pregnancy would endanger the woman's health. A semen analysis and a postcoital test should also be performed to assess the fertility of her partner (107, 129, 282).

The condition of the fallopian tubes at the time of reversal is a key determinant of the success of the operation. Pathological

Table 1 (Cont.)

Author & Date	Ref. No.	Country	Dates of Series	No. of Cases	% of Women Experiencing Outcome			Ectopic/All Reported Pregnancies (%)
					Live Birth	Abortion	Ectopic Pregnancy	
D. RECENT STUDIES, MAGNIFICATION, ATRAUMATIC TECHNIQUES								
Ansari 1979	14, 16	US	1973-1977	15	40	7[g]	0	0/7 (0)[h]
Daniell 1979	68	US	1976-1978	24	50	NA	4	NA
Diamond 1979	71	US	1975-1977	12	75	NA	0	NA
Diamond 1977	74	US	1972-1973	28	57	14[e]		NA
Gomel 1980	104	Canada	1971-1980	118	64	9	1	NA
Hochuli & Gehring 1978	127	Federal Rep. of Germany	NA	12	25	25	17	2/8 (25)[h]
Jones & Rock 1978	158	US	1977	12	75[f]	NA	8	NA
Lieberman & Anderson 1978	176	UK	1973-?	3	33	33	0	0/2 (0)[h]
Nakamura 1980	206	Brazil	1978-1980	3	67	0	0	0/3 (0)
Novy 1980	212	US	1975-1978	9	44[f]	11	NA	0/6 (0)[b]
Owen & Pickett-Heaps 1977	214	Australia	NA	10	60	NA	0	NA
Paterson 1980	222	Australia	?-1979	50	40	6	4	2/25 (8)[h]
Rock et al. 1980	255	US	1976-1979	30	60	7	3	1/21 (5)[h]
Silber & Cohen 1980	292	US	NA	25	56[f]	NA	4	NA
Vammen et al. 1979	317	US	1962-1977	17	59	18	6	1/14 (7)[h]
Williams 1977	328	UK	NA	25	72	NA	NA	NA
Wilson 1980	334	Australia	1974-1975	41	39	5	5	2/20 (10)[h]
Winston 1980	338	UK	NA	126	58	NA	2	NA
Total				**560**	**56**	**9[g]**	**3[g]**	**8/106 (8)**

NA = not available

[a] Intrauterine pregnancies; outcome not reported
[b] Repeat live births reported
[c] Insufficient number reported for derivation of meaningful totals
[d] Possible ectopic pregnancy; lost to follow-up.
[e] Includes spontaneous abortions, ectopic pregnancies, and molar pregnancies.
[f] Live births plus intrauterine pregnancies continuing at time of report or when lost to follow-up.
[g] Based only on series reporting number of abortions or ectopic pregnancies.
[h] No repeat live births reported; not known if any occurred. Rate of ectopic pregnancy therefore may be overestimated.

5

conditions such as extensive endometriosis, chronic pelvic inflammatory disease (PID) and tuberculosis are usually considered contraindications to anastomosis. In addition to blocking extensive areas of tube, these conditions often recur after reversal, reblocking the tubes and making pregnancy unlikely (129, 282, 299).

Hysterosalpingography can be used to check the patency of the proximal segment of the tube up to the point of occlusion. The uterine cavity is injected with radioopaque material which flows into the tubes if they are normal and can be seen on an x-ray. Hysterosalpingography also permits a view of the mucosal folds of the tube (73, 128, 129).

If no pathology has been found, screening is completed with endoscopic instruments — either laparoscope or culdoscope — used to inspect the tubes and other organs in the pelvic cavity directly. Endoscopy can be used to determine the length of remaining tube, tubal or abdominal pathology, and the presence of fimbria (68, 106, 221, 258, 288, 299).

Type of Sterilization Procedure

Sterilization procedures differ in many ways that can influence the success of reversal: first, by the type of action on the tubes, for example, crushing, ligation, excision, electrocautery at high or low temperatures, embedding incised tubal ends in other structures, use of rings, clips, plugs, or sleeves plus many combinations and variations of these; second, by the site of action, which may range from the fimbria to the cornu; and, third, by the extent of tubal damage. (See **Population Reports,** Series C, No. 7, *Tubal Sterilization: Review of Methods,* May 1976, for an illustrated description of various female sterilization procedures.) Current research suggests that the extent of tubal damage, or conversely, the amount of remaining or undamaged tube, makes more difference to subsequent pregnancy rates than either the type of sterilization action or its site.

The two most widely used and to date most frequently reversed sterilization procedures have been the Pomeroy procedure and electrocautery (270, 287). The Pomeroy procedure — a simple method of combined ligation and excision — usually removes 3 to 4 cm of the isthmic or ampullary portions of the tube (270) but can be more extensive (292). (See Figure 2.)

Electrocoagulation usually damages at least as much tissue as ligation: bipolar electrocoagulation, about 3 cm; unipolar electrocoagulation with resection, usually at least 4 cm (79, 270). With unipolar coagulation tissue destruction can be difficult to control, however, and may be extensive, especially if multiple burns are used. (See Figure 3.)

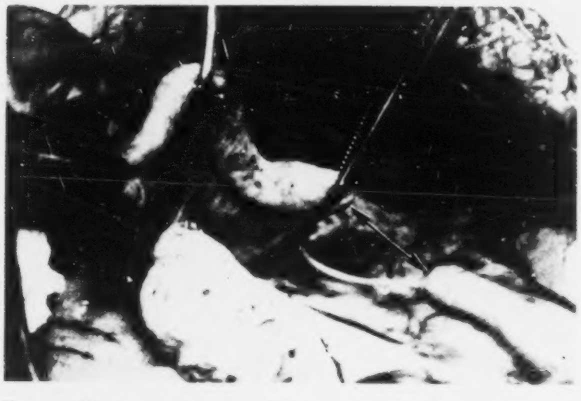

Figure 2. About 3 cm of the ampullary portion of this tube were excised during sterilization. This is characteristic of tubal damage following a Pomeroy procedure. (From Silber (293).)

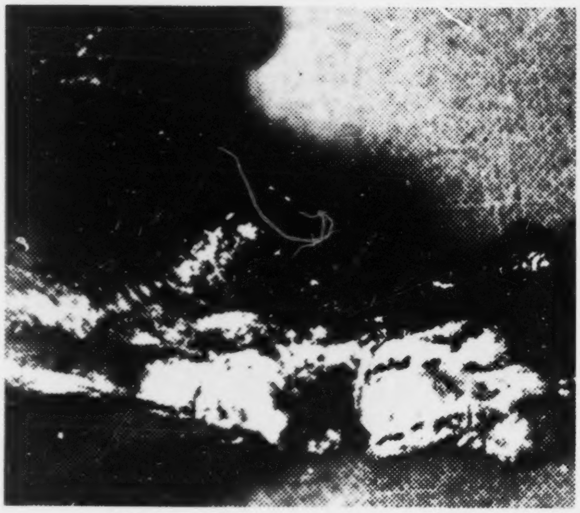

Figure 3. A fallopian tube after electrocoagulation. Tubal damage caused by electrocoagulation can be extensive, and so prospects for reversal may be poor. This photograph shows a surgical specimen whitened with chalk for clarity. (From Brenner, W.E., Edelman, D.A., Black, J.F., and Goldsmith, A. Laparoscopic sterilization with electrocautery, spring-loaded clips, and silastic bands: technical problems and early complications. Fertility and Sterility 27(3): 256-266. 1976. Reproduced with the permission of the authors and the publisher, The American Fertility Society, Birmingham, Alabama.)

To the extent that reports on reversal specify the type of sterilization performed, ligation seems to be slightly easier to reverse than electrocautery, although the data are far from conclusive. Of 188 cases of ligation reversed by various techniques reported since 1970, 86 (46 percent) have been followed by live births (14, 17, 68, 71, 74, 106, 127, 157, 191, 214, 230, 254, 288, 311, 317, 341). Of 44 electrocautery reversals reported in the same period, 13 (30 percent) have been followed by live births (68, 201, 214, 230, 254, 325, 334, 341). This follows screening in which a larger proportion of electrocautery cases may already have been ruled out. In a survey, members of the American Association of Gynecologic Laparoscopists (AAGL) reported that they had refused reversals to 80 percent of women who had been sterilized by electrocoagulation compared with 55 percent of women sterilized by the Pomeroy technique (237).

Less common procedures, such as the Irving technique or fimbriectomy, that bury or suture the ligated ends of the tube to other adnexal structures or that remove the fimbria and the distal segment of the tube may destroy half of the tube or more (270) (see Figure 4).

The procedures which may do least damage to the tube — the clip and the ring — are relatively new, and few women sterilized by these techniques have yet requested reversals (see pp. C-106-107).

Tubal Length

A small but growing body of evidence testifies to the importance of tubal length to the success of anastomosis, whether measured in terms of live birth rates or length of time to pregnancy (104, 292, 335, 340). Using microsurgical techniques, Sherman Silber and Robert Cohen performed reversal procedures on 25 women, rejecting no one on the basis of tubal length. Pregnancy rates varied from zero with less than 3 cm of tube to 100 percent with more than 4 cm of tube (292):

Cm of Tube Remaining	No. Pregnant/ No. Operated On	% Pregnant
<3	0/7	0%
3-4	3/7	43%
>4	11/11	100%

Winston also reported that pregnancy rates are influenced by tubal length, although the association is not as strong as that reported by Silber and Cohen (338, 340):

Cm of Tube Remaining	No. Pregnant/ No. Operated On	% Pregnant
≤4	4/11	36%
4.1-6	8/15	53%
>6	7/9	78%

P.C.M. Wilson has also noted the importance of tubal length in a series of 33 cases (335). As in Silber and Cohen's series, no cases were rejected on the basis of tubal length:

Cm of Tube Remaining	No. Live Births/ No. Operated On	% With Live Births
<5	3/10	30%
>5	13/23	57%

Gomel reports that length of tube is related to the length of time between the procedure and pregnancy. Among 47 cases followed up for 18 months or more, all nine women who conceived in the first cycle after surgery had 5.5 cm of tube or more remaining. Those who had 4 cm of tube or less had a pregnancy rate not significantly different from the rate for the entire series, but conception took significantly longer — 19.1 months compared with 10.2 months for the entire series (104).

Research on rabbits also has demonstrated the importance of tubal length. Winston found that "when more than 70 percent of the ampulla was resected, there was total impairment of function" (337). Peter McComb and Victor Gomel found that no implantations occurred in the animals' uterine horns if more than half of the tubes had been excised, but implantation rates were near normal if more than 80 percent of the tubes remained (190).

Studies suggest that intramural-isthmic and isthmic-isthmic anastomoses have the best chances of successful reversal (255, 292, 340) (see Table 2). This may be because less tube has been damaged and the portions being anastomosed are of similar diameters, making the procedure easier (see p. C-109). Some evidence suggests that pregnancy can sometimes occur even when important portions of the tube have been destroyed. Pregnancy has been reported in a woman with less than one cm of ampulla remaining and in women without fimbriae or without cornua (212, 230, 292). In fact, live births have been reported even when there is no tube at all and the ovary has been implanted in the wall of the uterus (Estes procedure) (322).

Table 2. Intrauterine Pregnancies After Tubal Anastomosis, by Site of Anastomosis

Site of Anastomosis	No. With Intrauterine Pregnancies/ No. of Cases: Winston 1979 (340)	Rock et al. 1980 (255)	Silber & Cohen 1980 (292)	Total
Intramural-isthmic	9/13	1/1	1/1	11/15 (73%)
Intramural-ampullary	12/22		7/13	19/35 (54%)
Isthmic-isthmic	11/14	7/12		18/26 (69%)
Isthmic-ampullary	8/14	13/28	6/11	27/53 (51%)
Ampullary-ampullary	8/18	7/8		15/26 (58%)
Total	48/71 (68%)	28/49 (57%)	14/25 (56%)	90/145 (62%)

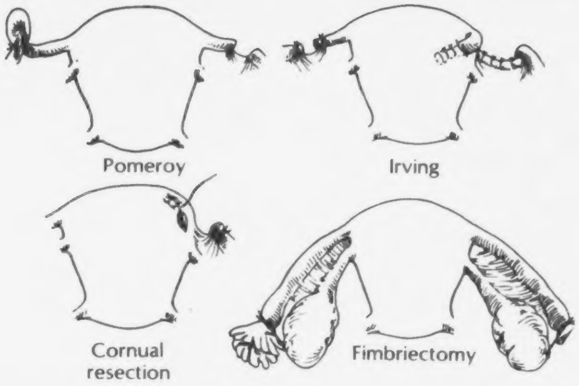

Figure 4. Some of the most common tubal ligation techniques. The tube at left in each diagram shows the ligation procedure; the tube at right shows the results of the completed procedure.

Sequelae of Sterilization

In addition to the direct action on the tubes, other, unintended sequelae of sterilization — or of other abdominal procedures — can make successful reversal more difficult. For example, short-term complications might include bleeding, injuries to the mesosalpinx and its blood vessels, and infections (67, 85, 188, 237). All can lead to adhesions. If extensive, the adhesions could discourage subsequent reversal. Even if they are not extensive, they would have to be removed during the reversal procedure and may recur if not carefully excised.

If the sterilization procedure interferes with the blood supply to the ovaries, luteal phase deficiency and irregular ovulation may result. In a recent, and as yet unreplicated, study, Ewa Radwanska and colleagues compared 40 sterilized women who had normal menstrual patterns with 24 unsterilized women. They found that midluteal phase mean serum progesterone levels were lower in a significantly larger proportion of the sterilized group than in the control group. These results suggest that ovarian function may sometimes be impaired by sterilization. This could help to account for continuing infertility after reversal in some women (241).

A recent unpublished study raises the possibility of another barrier to reversibility. In 16 of 25 cases where tubes were evaluated after sterilization, John Rock and colleagues clinically observed apparent endometriosis at the tip of the proximal tubal segment (256). They suggested that, where laparoscopic sterilization was performed within 4 cm of the uterine cornu, development of fistulae and/or endometriosis might lead to subsequent unwanted pregnancies as well as cause pain and irregular menstrual bleeding.

Reporting Relevant Information

Thorough recording of information at the time of screening and after reversal procedures is important not only to assess screen-

(Continued on p. C-106)

THE FALLOPIAN TUBE: PHYSIOLOGY AND FUNCTION

The fallopian tube, or oviduct, provides a path for the ovum from the ovary to the uterus. During the 80 hours that the human ovum usually takes to travel from ovary to uterus (64), the tube supplies a suitable environment to support the ovum and sperm, to facilitate their union, and to sustain the initial development of the resulting zygote. Cilia (hairlike projections of epithelial cells) which line the lumen (open passage within the tube), tubal contractions, constriction, and mucus all act to regulate the passage of the ovum moving toward the uterus and of the sperm moving in the opposite direction.

The human fallopian tube averages about 11 cm in length. It can be as short as 6 cm or as long as 15 cm. The tube contracts and lengthens during the menstrual cycle and is longer immediately postpartum than at other times (310, 350). The end of the tube opening into the uterus is the proximal end (that is, nearest to the midline of the body), and the end opening into the pelvic cavity near the ovary is the distal end (away from the midline). The tube is enclosed in a portion of the broad ligament known as the mesosalpinx. Because the tube is slightly longer than the portion of mesosalpinx in which it is located, it tends to be somewhat convoluted (see Figure 5).

There are four regions of the tube (see Figure 1). At the distal end, the **infundibulum,** about 2 cm long, is the trumpet-shaped portion of the tube, ending in the fimbria, which opens into the abdominal cavity near the ovary. The infundibulum joins the **ampulla,** a segment 5 to 8 cm long, and is sometimes considered part of it. Connected to the ampulla is the **isthmus,** about 2 to 3 cm long, which in turn leads to the **intramural,** or interstitial, portion, which is the segment of the tube enclosed in the wall of the uterus. This portion of the tube is usually 1 to 3.5 cm long, depending on the course it takes through the uterine wall (301).

At the time of ovulation, the fimbria and the many cilia in the fimbria and **infundibulum** increase the frequency of their

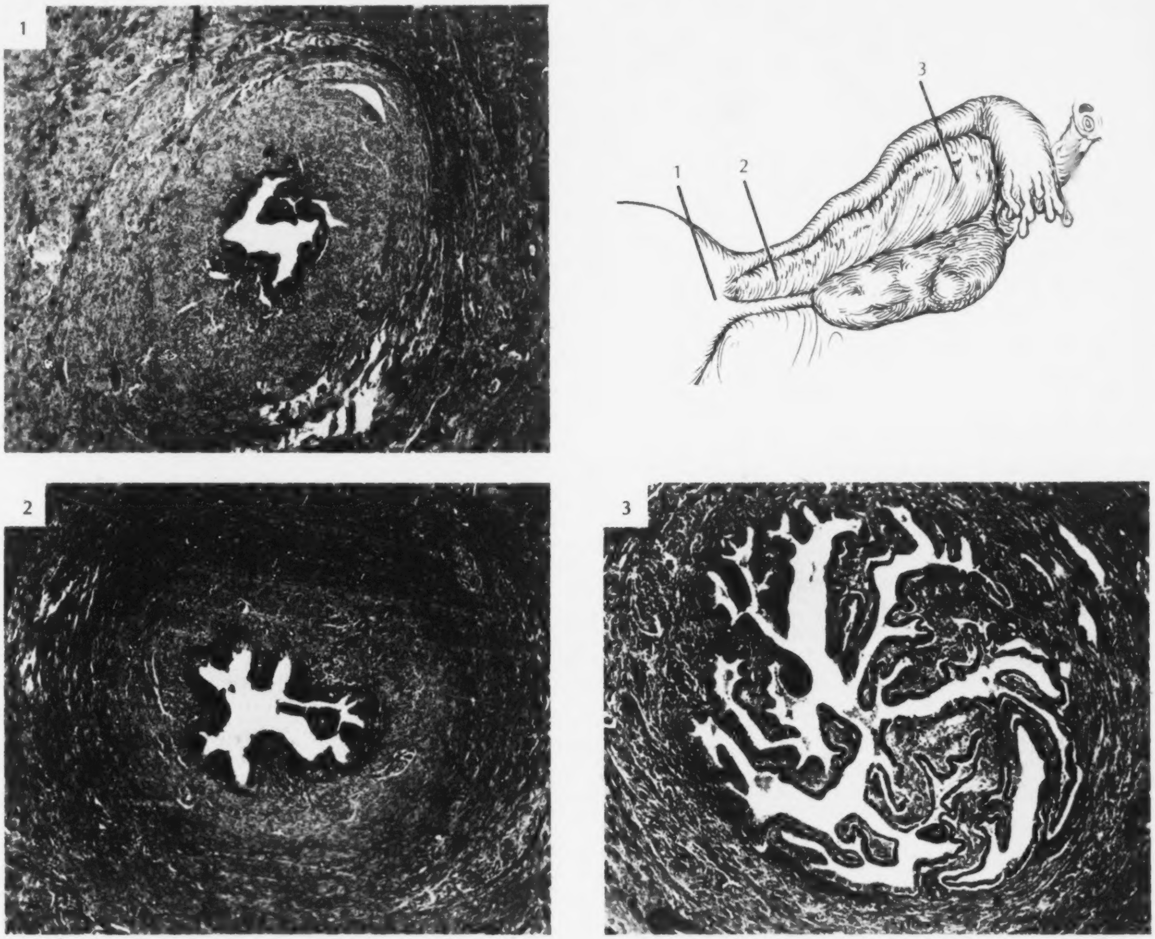

Figure 5. Photomicrographic cross-sections of the fallopian tube showing (1) the intramural portion of the tube, (2) the isthmus, and (3) the ampulla. The cross-sections correspond to the numbered positions on the accompanying drawing. The lumen is clearly defined in the intramural and isthmic regions but larger and convoluted in the ampulla. (Photos courtesy of Tim Parmley and John Repke)

activity, thus drawing the ovum into the fallopian tube. Also, at ovulation the secretory cells, which have grown taller during the early phase of the menstrual cycle, rupture, releasing into the tube fluids, including nutrients that support the ovum and sperm (180) (see Figure 6).

The **ampulla** has a thin muscle wall, composed of mixed longitudinal and circular fibers, and a well developed layer of mucosa lining the lumen that consists of both cilial and secretory cells. The lumen of the ampulla varies in diameter from about 2 cm at the distal end to 2 to 3 mm or less at the proximal end, where it joins the isthmus. Cilia, which comprise half the epithelial cells in the ampulla, beat toward the uterus. Along with fluid flow and muscular contractions, cilial beat may be responsible for ovum transport in the ampulla (350).

The ovum spends close to 72 hours in the ampulla before entering the isthmus, as the work of Héctor-D. Croxatto and colleagues has shown (64). During this time the endometrium of the uterus develops to support implantation of a fertilized ovum. The sperm also must spend time in the female reproductive tract to become capacitated, that is, able to penetrate the surface of the ovum.

At the **isthmus** the ovum cannot proceed further because of the narrow lumen, which becomes filled with mucus by the time of ovulation (154). (See Figure 7.) The mucus facilitates the movement of sperm while inhibiting the cilia from beating and keeping the ovum from entering the isthmus (154). The isthmus has a narrow lumen, tapering down to 400 μ at its midsection (350), and a thick muscle layer with three distinct components — (1) an inner portion, with muscle fibers running longitudinally, which thins and disappears about 2 cm from the uterotubal junction; (2) a middle, circular portion; and (3) an outer, longitudinal portion. All three are thickest in the midportion of the isthmus and thinnest towards the ampulla. The isthmus has a relatively thin mucosal layer with fewer ciliated cells than the ampulla (180).

After ovulation (around day 18 of the cycle), secretory cell activity in the isthmus decreases under the influence of ovarian hormones. The mucus clears and the isthmus appears to be dilated (154). (See Figure 8.) In addition, after fertilization the cumulus mass of follicular cells surrounding the ovum breaks up. These changes facilitate passage of the fertilized ovum through the narrow isthmus.

The **intramural portion** is similar to the isthmus in muscle structure and lumen diameter. In most tubes the course of the intramural portion includes at least one right-angle turn or several convolutions (71, 301).

Some of the functions of fallopian tubes are redundant. Pregnancy can occur even if tubal function is considerably altered; neither muscular activity nor cilial beat is absolutely necessary to ovum transport (9, 119, 156). Current research suggests that only three conditions may be necessary to assure some chance of pregnancy when tubes are repaired:

- enough tube to reach from the ovary to the uterus
- sufficient tubal function to delay the ovum until the endometrium is ready for implantation
- enough mucosa in the tube to produce the fluids that support and regulate the movement of ovum and sperm.

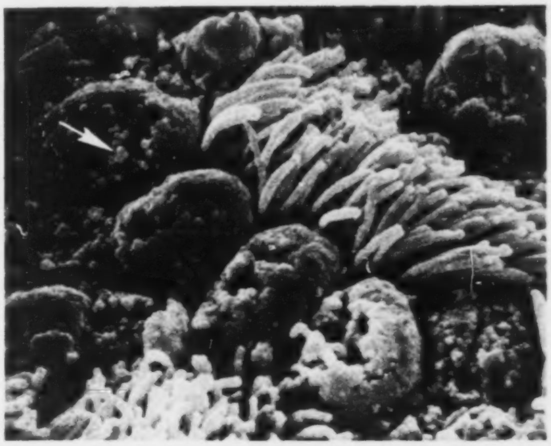

Figure 6. The inner surface of the ampulla at the time of ovulation (x5,000). A row of secretory cells appears between ciliated cells. The membranes in the apexes of the secretory cells have burst, and small droplets of secretory material are distributed around the apertures (arrow). (Courtesy of Hans Ludwig and Hildegard Metzger (180).)

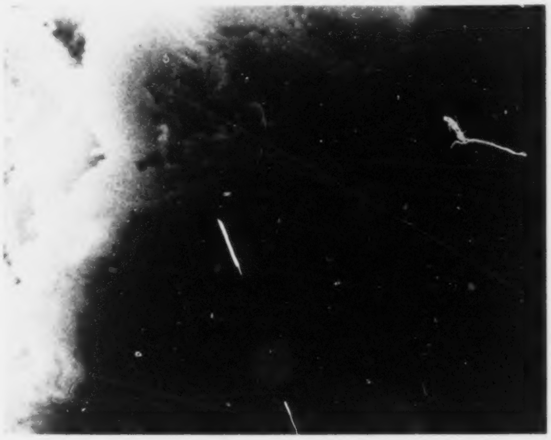

Figure 7. In the isthmus in the late proliferative phase, at the time of ovulation, the secretory activity is so intense that the lumen is filled with mucus, facilitating sperm transport. (Courtesy of Robert P.S. Jansen (154).)

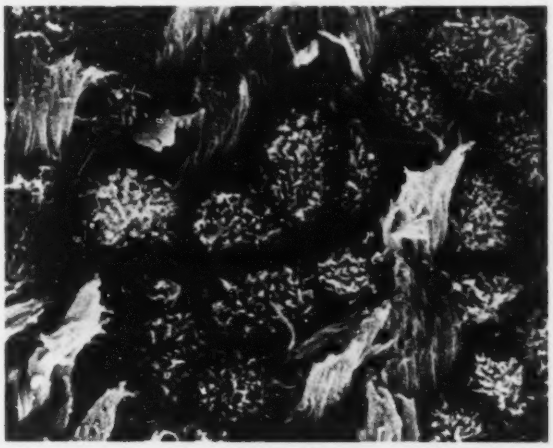

Figure 8. The erect cilia (x3,000) of the isthmus in the early luteal phase shortly after ovulation. No secretory activity is apparent. (Courtesy of Robert P.S. Jansen (154).)

ing criteria, surgical techniques, and the reversibility of specific sterilization methods, but also to be able to offer each woman who seeks reversal a realistic appraisal of her chances for success.

The success of sterilization reversals is commonly measured by the proportion of women operated on who subsequently achieve intrauterine pregnancies or live births. This method of reporting, however, leaves important questions unanswerable (62, 292). The importance of screening relative to surgical technique cannot be assessed. As many as 70 percent of women requesting sterilization reversal may be turned away after screening (237, 258, 345), a figure that suggests the relative importance of screening. Also, since the length of follow-up and the interval between procedure and pregnancy are usually not reported, success rates cannot be compared among studies.

Research considerations may sometimes have to be weighed against other considerations. When screening is rigorous, for example, success rates are relatively high for the women undergoing the procedure, but it is difficult to determine which variables most affect pregnancy. When screening is minimal, success rates are low, but it may be easier to learn which variables, such as tubal length, most affect the chances of pregnancy.

In addition to details on the surgical techniques employed, the following information, obtained from screening, should be recorded and reported:

- the age and general health of the woman
- other factors that might affect fecundity
- for those rejected as a result of screening, the reasons for rejection — particularly if they relate to tubal factors
- for those accepted, the interval between sterilization and reversal
- the type of sterilization procedure originally performed
- the length and segments of tube remaining intact before reversal is attempted.

The last information is particularly important. Silber and Cohen note:

> Whenever a new tuboplasty series is published using one technique or another, with loupes or with microscope, with splint or without splint, no comparison of pregnancy rates can be made between these various techniques unless accurate information is available on the length and quality of the tubes . . . . Comparing the crude pregnancy rate of one series with that of another is invalid unless the preoperative condition of the tubes is carefully characterized. (292)

In following up cases, the length of time that elapses between the procedure and each normal pregnancy, ectopic pregnancy, and spontaneous abortion should be recorded. In addition, the length of time between the procedure and each follow-up should be recorded for every woman, whether she has become pregnant, failed to become pregnant, or been lost to follow-up. With these data, it would be possible, using life table techniques, to compare success rates accurately (62).

MORE REVERSIBLE STERILIZATION PROCEDURES

While, after screening, Pomeroy and electrocautery procedures can now be reversed in up to about 60 percent of cases, other sterilization techniques such as clips, rings, plugs, and ovarian or fimbrial coverings offer a theoretical possibility of even greater reversibility. Only limited data are yet available, however.

Clips and Rings

Occlusive devices such as clips and rings that cause less tubal damage but require the same reversal procedure as Pomeroy ligation or electrocautery are already in use. The Hulka-Clemens spring-loaded clip destroys less than 1 cm of tube while the tubal ring destroys about 3 cm (79, 270). Studies of more than 20,000 women by the International Fertility Research Program (IFRP) show that surgical complications with the original spring-loaded clip inserted via laparoscope are comparable to those of Pomeroy ligation via minilaparotomy (1.1 compared with 1.2 percent); complications with the Yoon ring (also known as the Falope-Ring) and the redesigned clip are higher but roughly comparable to those of electrocoagulation (2.9-2.8 compared with 2.2 percent) (88). The pregnancy rate after 12 months was relatively high with the original Hulka-Clemens spring-loaded clip — 2.0 per 100 women — but dropped to 0.5 per 100 when the clip was redesigned. The failure rate for the Yoon ring applied via laparoscope was comparable — 0.6 per 100. For electrocoagulation the pregnancy rate was 0.3 per 100. Pregnancy rates after sterilization procedures using minilaparotomy rather than laparoscopy were 0.0 for the Yoon ring and 0.2 for Pomeroy ligation (188). (See Figures 9 and 10.)

Although there are only a few reports to date on reversals of clip sterilization, preliminary results seem encouraging. Reversals, performed by various surgeons, of clip sterilization have been followed by intrauterine pregnancy in 21 of 26 cases (81 percent); in addition, one woman had an ectopic pregnancy after the reversal (143, 174). There are only eight reported cases of reversal of Yoon ring sterilization. Six had led to intrauterine pregnancies by the time of reporting (104, 254, 340). An advantage of the ring over ligation or electrocautery may be that, while it damages as much tissue as the average Pomeroy ligation, the damage will be consistently about 3 cm of tube, while Pomeroy procedures may sometimes destroy much more.

As reversal procedures become more widely available, the potential for reversibility becomes more important to the choice of sterilization method, especially in the case of young women with few children, who may be most likely to find their circum-

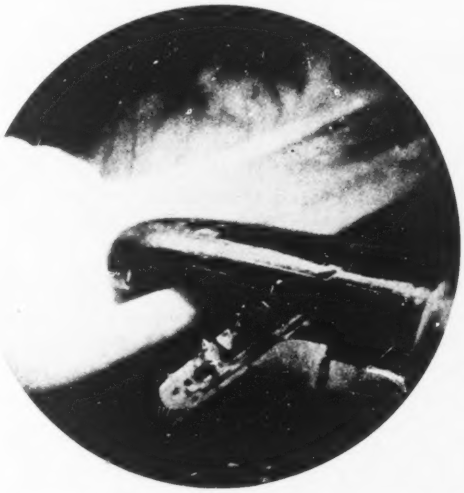

Figure 9. A Hulka-Clemens clip in its laparoscopic applicator before closing on a fallopian tube. The clip damages one cm or less of tube, considerably less than ligation or electrocautery, and so it may offer a better chance for reversal. (Courtesy of Jaroslav Hulka)

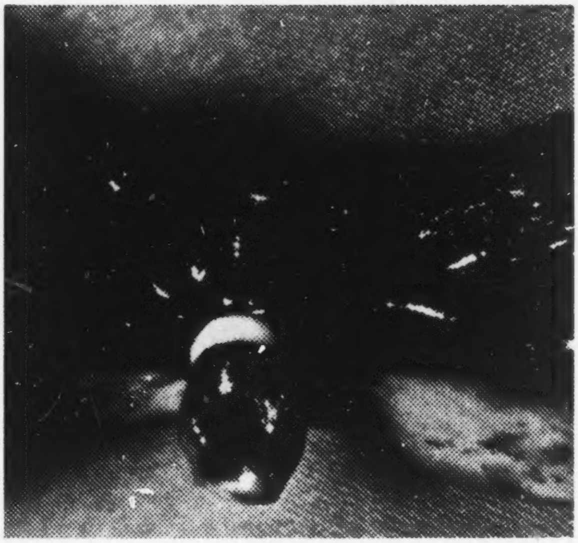

Figure 10. A Falope-Ring in place on a surgical specimen. Rings damage about 3 cm of tube. They are expected to be more reversible than ligation or electrocautery, but few reversals have been reported. (Source: see Figure 3.)

stances changed and want to regain their fertility (143). If a woman may one day want reversal, occlusive methods appear preferable to electrocoagulation (2, 188). Table 3, adapted from a table prepared by John J. Sciarra, indicates some of the variables that would have to be estimated and assessed in making a choice of sterilization method (270).

Even now, some physicians appear to be shifting to occlusive devices. Members of the American Association of Gynecologic Laparoscopists reported that between 1975 and 1976 use of electrocoagulation dropped from 96 percent of procedures to 84 percent and use of rings rose from 4 to 16 percent (237). Presentations at the 9th World Congress of Gynecologists and Obstetricians, held in Japan in 1980, emphasized the use of occlusive devices as a substitute for electrocoagulation — a trend lauded by the *British Medical Journal* in an editorial (2). The Johns Hopkins Program for International Education in Gynecology and Obstetrics (JHPIEGO) and the International Project of the Association for Voluntary Sterilization (IP/AVS), two major USAID-funded international donors of laparoscopes, shifted in the mid-1970s from supplying electrocoagulation units to Falope-Ring units (51). Some of the equipment provided now offers both ring and electrocautery capability (213).

Since 1976 some 140,000 pairs of spring-loaded clips have been sold by the manufacturers, Richard Wolf Medical Instrument Corporation, which calls its product the Hulka-Clemens clip, and Rocket of London, which calls its product the Samaritan clip. Also being marketed is the Bleier clip, manufactured and sold by Gerhard Hug GmbH of the Federal Republic of Germany and also sold by the Eder Instrument Company of the US. While promotional material for the Bleier clip emphasizes potential reversibility, no reversals have yet been reported. Still another occlusive device, the Filshie clip, is undergoing clinical trials in the UK (143).

Experimental Procedures

In the future sterilization procedures that are even less damaging and easier to reverse than ligation, clips, and rings may be developed. Experimental devices include silastic pouches to cover the ovaries or fimbria and use of silastic plugs inserted through the uterus into the tube. Although theoretically these procedures may be more reversible, there is no information available to date either on reversals performed or on subsequent pregnancy rates.

In ovariotexy, the ovary is covered by a silastic pouch which is sutured to the ligament supporting the ovary. The ovary, in its silastic pouch, is then buried in the broad ligament (349). Some interest in this procedure developed in the early 1970s, but little work has been reported since.

The same procedure can be used to encase the fimbria. In fimbriotexy, the fimbrial end of the tube is covered by a silastic cap or hood. The chief problems are securing the cap and avoiding constriction, infection, and fimbrial damage. A variety of suturing techniques have been tried in addition to burying the fimbria in the broad ligament (3, 81, 87, 171, 172). In a series of 20 baboons, William Droegemuller has used a polytetrafluoroethylene sleeve to anchor the fimbria in a protected extraperitoneal space; results, still unpublished, are considered promising (80). Although both ovariotexy and fimbriotexy are theoretically reversible, tissue growth over the cap and adhesions to the cap material or the suture sites might limit reversibility (81, 87, 170). Slippage of the devices is likely to be their major problem as a sterilization technique (172). While the removal procedure would be shorter and simpler than anastomosis, both initial application and reversal would require laparotomy.

Hysteroscopically delivered molded silastic plugs might also provide easy sterilization and easy reversibility, but this type of sterilization, first considered in the mid-1960s (56), is still very much in the experimental stage (121, 244, 245, 249). Placement of silicone rubber plugs in the fallopian tubes via the vagina and uterus would have the basic advantage over other sterilization methods of requiring no incision or abdominal surgery for either placement or removal. A specially designed hysteroscope is inserted through the cervix into the uterus to the uterotubal junction. Silicone rubber is pumped through a channel in the hysteroscope into the fallopian tubes. Mixed with a catalyst, the silicone hardens into a plug that fills about two-thirds of the tube. It remains in place because, taking the shape of the tubal lumen, it is thicker at both ends than in the

Table 3. Techniques of Female Sterilization and Potential for Reversal

Sterilization Technique	Extent of Use[a]	Tubal Destruction (in cm)	Failure Rate Per 1,000 Women at 12 Months[b]	Potential for Reversal
Pomeroy type ligation/excision	5	3-4	2	Good
Laparoscopy electrocoagulation/ division	4	3-6	3	Fair
Falope-Ring	3	3	6	Good
Modified spring-loaded clip	2	1	5	Very good
Fimbriectomy	1-2	5	NA	Poor
Irving type	1	4	NA	Poor

[a] Arbitrary scale of 1 (least popular procedure) to 5 (most common procedure)
[b] Data from International Fertility Research Program, McCann & Cole (188)

Source: adapted from Sciarra (270)

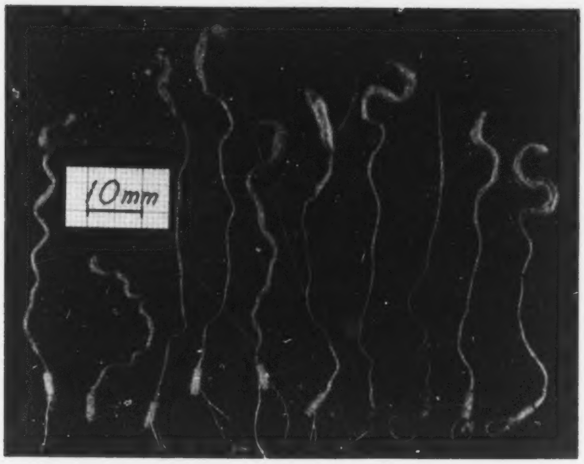

Figure 11. Silicone tubal plugs, still in the experimental stage, may prove to be a more reversible sterilization method than current methods of occluding tubes. The plugs shown here were formed by injecting into the patients' tubes emulsified silicone mixed with a catalyst to hasten hardening. (Courtesy of Robert Erb)

middle. A tip bonded to the cured plug provides a means of removing it (4, 93, 247). (See Figure 11).

The major problem with molded silastic plugs has been failure of the plug to block the tube. Also, expensive equipment and much skill and experience in the method are required, making it unlikely that it can be widely applied given current technology (249). Clinical trials on women were begun by Robert Erb and Theodore Reed in 1978 (4, 247). In 1979, 135 women underwent procedures for placement of plugs. In 99 cases the procedure was completed. By the end of the year 51 women were using no other contraception; one had become pregnant (357) The researchers plan to expand their study to 10 centers and 1,000 cases in 1980 (269).

A number of preformed plugs of silicone or polyethylene, intended for hysteroscopic delivery, are in various phases of early testing either in animals or in small numbers of women. These plugs appear promising, but further studies of pregnancy rates, reversibility, retention, and safety are necessary (269).

Despite the complexity of developing a safe and effective means of sterilization that is at the same time easily reversible, interest in this objective remains strong. A 1979 survey of 147 obstetrics-gynecology patients of reproductive age in Texas suggested that the number of women intending to be sterilized at some future time would more than double if reversal could be 95 percent effective and comparable in cost to current sterilization procedures (275). While the goal of a 95 percent reversible sterilization is not realistic for the near future, the survey shows how important reversibility might be in enhancing demand for female sterilization. In the meantime, new surgical techniques associated with microsurgery are being improved and training in these techniques is being expanded to increase the opportunities for reversal of sterilization procedures already performed.

MICROSURGICAL TECHNIQUES

To achieve higher live birth rates and lower ectopic pregnancy rates after reversing female sterilization or repairing fallopian tubes damaged by disease, surgeons over the last decade have adopted a cluster of techniques often referred to as microsurgery. The purpose of using these techniques is to minimize tissue trauma and to assure accurate dissection and suturing. Microsurgical techniques include:

- use of magnification
- accurate approximation (alignment) of tubal segments and placement of sutures
- electrosurgery to minimize bleeding
- special care to avoid leaving foreign matter in the operating field unnecessarily
- use of fine gauge, non-tissue-reactive suture material and fine needles
- irrigation of the operative site.

The chief purpose of magnification is to assure that all pathological tissue on the fallopian tubes is found and removed and, in conjunction with accurate approximation and suturing, that a patent, functional tube is produced. The chief purpose of the other measures is to avoid the formation of adhesions, which may kink or block the tube, preventing or impeding ovum transport.

Together these techniques have helped to raise the rate of term pregnancies reported after sterilization reversal from about 30 percent in the 1950s to 50 percent and higher by the late 1970s (see Table 1, p. C-100). An example of the role of microsurgery is a series, reported by Edward Diamond, of 360 women operated on to remove bilateral adnexal adhesions (not reversal of sterilizations). Before 1974, in this series bleeding was controlled by gauze and ligation, gauze pads were used for packing the peritoneal cavity, gloves were not rinsed, tissues were not irrigated during the operation, and no magnification was used. The pregnancy rate after surgery was 25 percent. After 1974, bleeding was controlled by unipolar and bipolar electrocoagulation, rubberized drapes were used in the peritoneal cavity, gloves were rinsed, tissues were irrigated during the operation, and magnifying equipment was used. The pregnancy rate rose to 57 percent (72).

Magnification

Surgeons using microsurgical techniques for anastomosis use microscopes, magnifying head loupes, and optical visors (33). Magnification may not be absolutely necessary, however, since a few surgeons have achieved high pregnancy rates by using atraumatic surgical techniques but no magnification (192, 230). The operating microscope is binocular, to provide perspective, and incorporates a coaxial lighting system for optimal illumination. The microscope magnifies the field of vision 4 to 30 times. Loupes and optical visors provide magnification ranging from 2 to 6 power. Visors are lighter than loupes

Classification of Procedures

Anastomosis procedures are classified in various ways depending on which segments of the tube are joined. In 1977 an ad hoc committee of the International Federation of Fertility Societies suggested five basic classifications for tubal anastomosis: intramural-isthmic, intramural-ampullary, isthmic-isthmic, isthmic-ampullary, and ampullary-ampullary (284) (see box, "The Fallopian Tube: Physiology and Function," p. C-104). Uterotubal implantation, although more often used in cases of pathological infertility, is also sometimes performed as a reversal procedure.

and can be easily pushed up when not needed. Both have greater depth and breadth of field than microscopes.

Many surgeons use both microscopes and loupes or visors, but there is debate over which is most useful (33). Advocates of the microscope cite its better lighting and optics (336). Advocates of loupes and visors say these devices are adequate for most work (106, 255). Loupes and visors are much cheaper than microscopes, costing between $400 (US) and $800 (32). An operating microscope with a beam splitter so that two people can see the magnified field of vision at the same time may cost $10,000 plus $10,000 to $40,000 for the mounting system (40).

Preparation for Anastomosis

Anastomosis by microsurgery usually takes about two hours and may take as long as five hours. The patient must be completely immobile. General anesthesia is necessary; the patient is anesthetized to the point at which her diaphragm does not move spontaneously. She is given sedatives (such as thiopental sodium), narcotics (such as morphine), and a muscle relaxant (*d*-tubocurarine chloride, succinylcholine, or pancuronium). Throughout the procedure a respirator delivers a mixture of oxygen and anesthetic.

After general preparation, including washing, emptying the bladder, shaving, anesthesia, and disinfection and draping of the surgical area, a transverse incision 15 to 18 cm long is made approximately at the pubic hair line.

During the procedure the surgeon is seated, with stool, microscope, and operating table adjusted so that the table provides an armrest (280). Fingertip precision is necessary to manipulate microsurgical instruments.

A four-bladed self-retaining retractor is used to maintain an opening in the abdomen of roughly 10 by 15 cm, large enough to give the surgeon room to operate. The bowel is kept out of the way under the rib cage by tilting part of the operating table at a 10° or 15° angle, so that the patient's shoulders are lower than her pelvis. Gauze pads or laparotomy sponges moistened with physiological saline solution may be placed under and around the uterus and tubes to raise them, making them more accessible and keeping them stable (107, 336).

After evaluating the condition of the tubes and uterus, the surgeon removes any pathological tissues such as adhesions or endometriosis. Removing all diseased or damaged tissue helps assure proper healing after anastomosis.

Aligning and Suturing Tubes

In order to reconstruct a functioning fallopian tube, the two segments of tube must be properly aligned and then sutured. Aligning the tubes is difficult because they are small and slippery. Suturing is difficult for the same reasons, especially if the surgeon wants to avoid placing stitches in the lumen. Suturing is particularly difficult when the two segments differ in lumen diameter and type of tissue. Surgeons have developed a variety of techniques for dealing with these problems.

Some surgeons suture the mesosalpinx before anastomosing the tubal segments in order to help bring the segments into proper position and take tension off the site of the anastomosis (104, 107, 158, 317). As an additional aid, Jerome Hoffman has used a rubber-shod clamp applied to the mesosalpinx about 1 to 2 cm below the fallopian tube. The clamp also gently compresses the blood vessels supplying the tube, thus reducing bleeding, and an assistant can rotate the tube by moving the clamp (131).

VASECTOMY REVERSAL

Although vasectomy, or male sterilization, is a simpler and safer procedure than female sterilization — and the reversal procedure is also simpler — success rates after vasectomy reversal procedures are not substantially greater. The rate of success, measured by the appearance of viable sperm, is about 70 to 80 percent using conventional surgical techniques and up to 90 percent, reported by Silber, using microsurgery (291). The rate of pregnancies is much lower, however, about 40 to 50 percent, or up to 70 percent after microsurgery (291, 297).

Some of the factors that may contribute to higher success rates in reversing female sterilization also contribute to higher success rates in vasectomy reversal. These include:

- a shorter length of tube, or vas, excised (21)
- meticulous microsurgery in anastomosis (291)
- the location of the original excision (vasectomy reversal is more difficult if the vas was excised in the lower, more convoluted portion) (297)
- a shorter duration of time between vasectomy and attempted reversal (21, 291).

In the male, as in the female, physiological changes may occur after sterilization that may decrease the likelihood of successful reversal. These are:

- the local effects created by the high pressure of seminal fluid on the epididymis after vasectomy, effects that may be reduced if granulomas form and fluid leaks from the vas (291)
- an increase in sperm antibodies among some vasectomized men, the effects of which are still unknown (297).

While these aspects of male physiology may limit the success rate after vasectomy reversal, male candidates for reversal are less rigorously screened than female candidates for such factors as age, general health, and the condition of the reproductive organs. Thus, while the pregnancy rate after vasectomy reversal is no higher than after reversal procedures for women, a larger proportion of male candidates may be considered eligible for the procedure. (31)

One technique that has been used to keep tubal segments aligned is splints. Nylon suture, 00 gauge, or nylon tubing of .5 mm diameter or less may be inserted through the lumen of both tubal segments. Such splints help to steady the tubes and to define the lumen during suturing. (If the ampullary segment is long and particularly narrow, however, or the intramural portion of the tube is convoluted, splints may be impossible to insert (71, 301, 328).) Some surgeons leave the suture material in place for some time after the procedure to keep the lumen open — that is, as a stent (276, 288). Others avoid stents for fear they may break, lead to bleeding or infection, or impair the action of the cilia (338). Still others use an absorbable suture as a stent (14).

If the segments to be joined are of different diameters, careful preparation to match the lumen sizes before suturing may be necessary. Several techniques have been developed to join the isthmus to the ampulla smoothly and without distorting the tissue. One approach is to excise a small button of tissue from the occluded end of the ampullary segment, creating an opening of the same size as the isthmic lumen (107, 158, 293) (see Figure 12). Sometimes the occluded end of the ampulla is too severely damaged to permit use of this technique or is buried in the mesosalpinx or blocked by nonabsorbable encircling sutures or a clip. Then a wedge can be cut from the isthmic segment at the edge opposite the mesentery so that the isthmic end of the tube can be spread slightly and sutured to the larger ampullary lumen (104) (see Figure 13). Another method is to cut the isthmic end of the tube more obliquely than the ampullary end, creating two lumens of similar diameter (74) (see Figure 14).

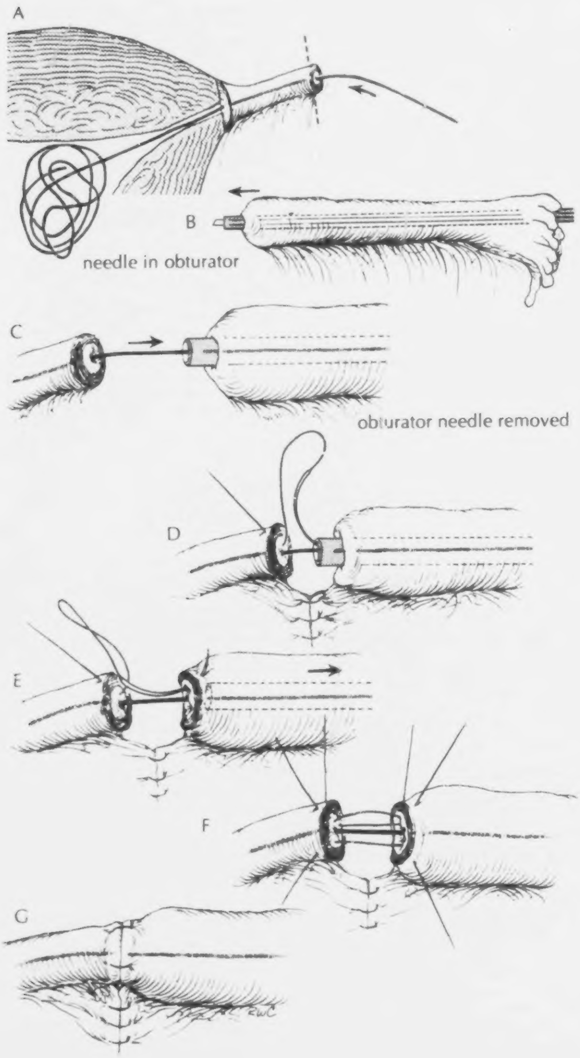

Figure 12. Method of anastomosing ampullary and isthmic segments of the fallopian tube, described by Howard Jones and John Rock (158). About half of a 00 nylon suture of approximately 100 cm length is passed through the isthmic stump and intramural portion of the tube into the uterus (A). A teflon obdurator from an intravenous placement unit is passed through the fimbrial end to the obstructed end of the ampullary segment. A needle is inserted through the obdurator and the obstructed end is punctured (B). The needle is removed and the 00 nylon suture is passed through the teflon obdurator (C). The mesosalpinx is approximated to reduce tension on the anastomosis site. The obdurator can then be used to help place sutures: The tip of the needle is placed on the inner edge of the obdurator (D). Then the obdurator is withdrawn slightly into the ampulla and the needle inserted into the tissue (E). In all, three 6-0 dexon sutures, at 4, 8, and 12 o'clock, are placed through all three tissue layers of both tubal segments (F). The sutures are then tied securely (G).

In anastomosis, fine needle holders and jeweler's forceps are used to manipulate the needle and to tie the knots (see Figure 15). Dexterity, steadiness, patience, and practice are required.

Which portions of tube are being joined affect the choice of suturing technique and the need for magnification. If two portions of isthmus are being joined, it is possible when suturing to exclude the mucosal layer and to stitch the relatively thick muscular layers and then the serosa separately (104, 341). If two segments of ampulla are being joined, the muscular layer may be too thin for this technique, so sutures may have to be placed through all layers. If the isthmus is being joined to the ampulla, the disparity in thickness of the tissue layers may make layer-by-layer suturing difficult and require suturing several layers together (74, 106, 107, 158, 293). Where anastomosis of narrow portions of isthmus or ampulla and/or suturing layer-by-layer is involved, use of a microscope may offer an important advantage over surgery without magnification (184). In every case the surgeon must weigh joining all three layers together in each stitch, which creates a secure seam, against leaving the mucosal layer undisturbed and joining the muscular and serosal layers separately, which, some surgeons argue, more closely replicates the natural structure of the tube (73, 158, 274, 356). Suturing techniques are illustrated in Figures 12-14.

The desire of some surgeons to avoid suturing the mucosa is based on theoretical considerations that have not yet been proved empirically. Theoretically, sutures in the mucosa might interfere with healing. Surgeons have achieved similar success rates, however, whether they suture (1) all three layers together (255), (2) only the muscularis and then the serosa (104), or (3) first the mucosa and then the muscularis and serosa together (74). Additionally, a study of rabbits found no difference in patency and pregnancy rates when the mucosa were avoided and when all three layers were sutured together (273). This suggests that refinements in suturing techniques beyond a certain point may not improve pregnancy rates.

Preventing Adhesions

Besides rejoining the tubal segments accurately, the surgeon's main concern is not only to remove any previously formed adhesions but also to prevent the subsequent formation of adhesions. Adhesions are bands of vascularized connective tissue that grow from one structure to another or to part of the same structure. When they form on the tissue of the fallopian tube, they can kink the tube, impair its mobility, and partially or totally block the lumen (72, 103, 123, 136, 303) (see Figure 16).

Adhesions form when damaged tissue comes in contact with blood, when tissue reacts to infections and irritating particles, and when blood supply to tissue has been interrupted (88, 203, 262). Such events are common in surgery. Bleeding during surgery, the introduction of irritating material, and, when blood is present, minor tissue damage — caused by excision of tissue, handling of organs, drying for short periods of time, and prolonged contact with normal saline and other physiologic solutions — have all led to adhesions in controlled studies of animals (88, 136, 203, 204, 262).

Electrosurgery

Blood is important to the formation of adhesions in two ways. First, blood contains fibrinogen, which contributes material to form adhesions. Blood also contains cellular material that inhibits the lysis of fibrin clots. Thus, when tissue is abraded and blood vessels are injured, fibrinogen is released and forms fibrin clots that adhere to damaged tissue (89, 262). Second, since adhesions function to supply blood to damaged tissue, fibrinous adhesions are most likely to persist when normal blood supply to tissue is seriously disrupted (89).

To minimize bleeding, unipolar and bipolar electrosurgical equipment is used in tubal surgery — unipolar microelectrodes to lyse adhesions, incise membranes, and cut and seal small blood vessels; bipolar forceps to coagulate blood vessels. Long, fine bipolar forceps are often used under an intermittent stream of normal saline. This "wet" technique, developed by neurosurgeons in the late 1930s, not only reduces tissue drying and shrinkage but also keeps the coagulated tissue from adhering to the forceps (115, 116, 117).

Because, at a mixed coagulating and cutting current setting, electrocautery seals blood vessels as they are cut, electrocautery allows less bleeding than the traditional techniques of stopping minor bleeding with gauze and major bleeding by tying off blood vessels. In addition, the fine needles used in electrosurgery allow surgeons to avoid cutting some blood vessels. There are no controlled studies, however, investigating whether electrocautery produces fewer adhesions than traditional techniques.

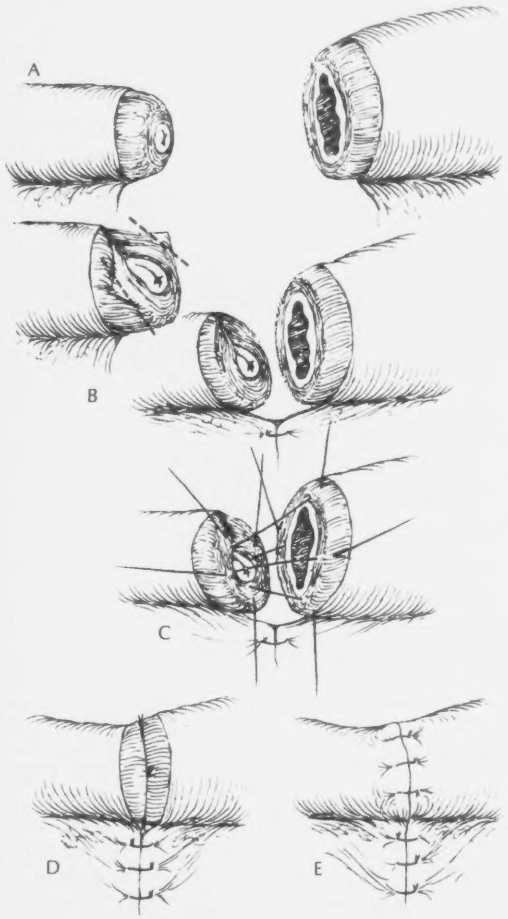

Figure 13. Method of anastomosing ampullary and isthmic segments of the fallopian tube described by Victor Gomel (104). The incised surfaces of the fallopian tube are examined under high magnification (x20) to see if all abnormal tissue has been removed. The normal muscle structure and pattern of mucosal folds should be apparent. The mucosal folds are pushed back into the lumen with a stream of irrigation solution (A). A slit of approximately 3 mm is made at the antimesenteric edge of the isthmic stump. The corners created by this slit are rounded off (B). An initial suture is placed in the mesosalpinx to bring the tubal segments together (C). Avoiding the mucosa, the surgeon sutures the muscularis with 4 or more 8-0 Vicryl interrupted sutures. Because the muscularis of the isthmus is thick, only one-third to one-half of it is incorporated in each stitch to avoid constriction. The muscularis of the ampulla is thinner and the suture usually passes through its whole thickness (D). The mesosalpinx (E) and then the serosa (F) are sutured with interrupted sutures (E).

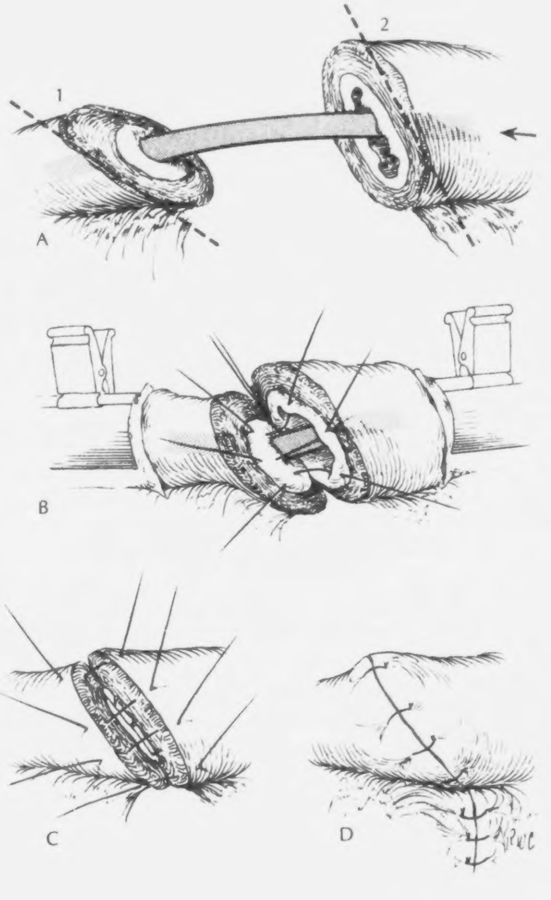

Figure 14. Edward Diamond describes a method of anastomosing an ampullary and isthmic segment of the fallopian tube (74). Oblique incisions are made in the anterior portion of the isthmic segment (1) and in the inferior portion of the ampullary segment (2). A fine polyethylene catheter is passed through the fimbriated end, out through the ampullary segment, and then into the isthmic segment (A). Encircling microvascular clamps are placed on the ampullary and isthmic portions to hold the tubal segments in close proximity and to reduce bleeding. The clamps also cause the mucosal layer to protrude from the excised ends of the tube. Four 10-0 Ethilon (black monofilament nylon) sutures are used to anastomose the mucosal layer of the isthmus to the mucosal layer of the ampulla (B). After these sutures are tied, each with three knots, 6-8 sutures are placed through the serosa and muscularis together (C). The sutures are securely tied, and several sutures are placed to close the gap in the mesosalpinx, completing the anastomosis of the tube (D).

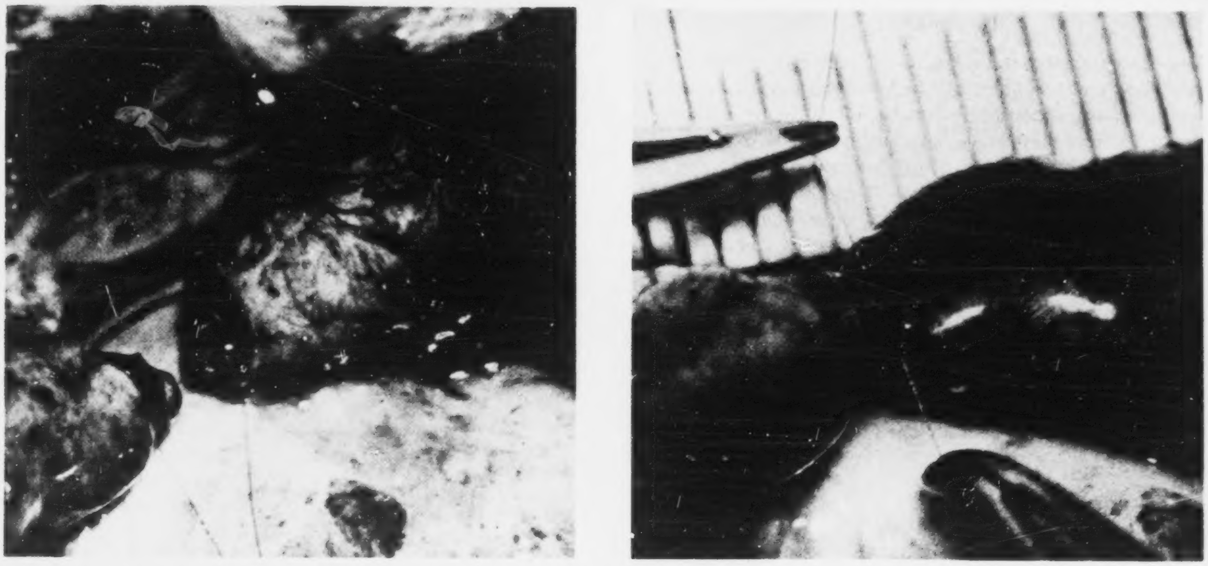

Figure 15. In this isthmic-ampullary anastomosis, at left, the muscular layers of the two segments are approximated with interrupted sutures. At right, suturing of the muscularis has been completed. The millimeter scale above shows the size of the area. (From: Gomel, V. Microsurgical reversal of female sterilization: a reappraisal. Fertility and Sterility 33: 587, 1980. Reproduced with the permission of the author and the publisher, The American Fertility Society, Birmingham, Alabama.)

Other methods of reducing bleeding that have been used in tubal surgery include injecting vasopressin (Pitressin) or epinephrine and saline solution into the tubal wall to constrict blood vessels (74) and using tubal clamps (74, 131, 336). Currently, Winston suggests that clamps be used only when persistent bleeding occurs, in order to minimize tissue trauma (338).

Eliminating Foreign Matter

Suture material and tiny particles of talc, starch, and lint induce the formation of foreign-body granulomas (growths composed of lymph and epithelial cells), which can develop into adhesions. In a study of 309 cases of intraabdominal adhesions, Lauri Saxén and Hannu Myllarniemi found foreign body granulomas in 61 percent. Talc, threadlike lint from gauze, and starch and suture material were the most common foreign matter identified (203, 263). Similarly, Diamond found lint, talc, or suture granulomas in 93 percent of women operated on for adhesions (72).

Figure 16. Adhesions like this can kink the tube and limit its mobility, preventing subsequent pregnancy. Atraumatic surgical techniques used in microsurgery limit the growth of adhesions. Here, an adhesion is removed from the tube and mesosalpinx after being freed from the pelvic wall. It is stretched and exised one layer at a time with an electrosurgical needle. (From: Gomel, V., Salpingostomy by microsurgery. Fertility and Sterility 29: 381, 1978. Reproduced with the permission of the author and the publishers, The American Fertility Society, Birmingham, Alabama.)

Surgeons have been aware for many years of tissue reaction to gauze and material used to dust surgical gloves (8, 97), but have not yet been able to eliminate entirely this source of adhesions. Because of wide publicity given in the 1940s to the risk of talc used to dust surgical gloves, talc was replaced by starch. Later, starch also was identified as a source of granulomas and adhesions (89, 203, 204, 263). Now surgeons routinely wash their gloves, but the usual washing methods often do little more than cause the starch to clump, increasing the length of time before it is absorbed (53, 351). Several rinsings reduce but may not entirely eliminate starch particles (207).

Catgut suture provokes tissue reaction in the process of being absorbed. Inflammatory responses surrounding catgut sutures have been observed in women who had undergone tubal reconstruction using traditional techniques (74). Fine gauge, single filament nylon suture, which provokes less tissue reaction, is now commonly used instead (107, 221, 233, 293, 339). Synthetic absorbable sutures such as Dexon and Vicryl also are used.

A study in rabbits illustrates the difference between catgut and nylon sutures. Some 92 percent of 25 rabbits with tubes anastomosed using nylon sutures subsequently delivered normal litters compared with 47 percent of 15 rabbits with catgut sutures. The tubes sutured with catgut had more adhesions, were thickened at the site of anastomosis, and were poorly revascularized (339).

Tissue Irrigation

During microsurgery irrigation is used almost continuously to prevent tissue from drying. If blood is present, even brief drying — whether from exposure to air or from the heat of electrosurgery — can cause tissue damage, resulting in adhesions. Normal saline or Ringer's lactate, now preferred by a number

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of surgeons, is widely used (283). Tests in rabbits show that a solution heated to body temperature is more effective in preventing adhesions than either no solution or a solution at room temperature (295).

Lavage with physiological solutions before closing the peritoneal cavity is the most common technique for removing fibrinous exudates, clotted blood, and other debris from the cavity. A number of proteolytic and fibrinolytic substances that might promote removal or absorption of fibrin deposits have been evaluated, but some at effective dosages posed too high a risk of hemorrhage, while others at safe dosages were ineffective (89, 136).

Several postoperative solutions have also been used to try to prevent formation of adhesions. Left in the abdomen after surgery, they may act in a variety of ways—promoting removal or absorption of fibrin deposits, reducing inflammatory response and exudate, stopping coagulation of fibrinous exudate, or creating a barrier that would physically block adhesions from forming between organs. None of these solutions, however, has yet been proved safe and effective in preventing formation of adhesions once tissue has been damaged (78, 89, 94, 126, 135, 136, 264, 282, 315).

RELATED RISKS

The risk of dying as a result of sterilization reversal is probably less than 100 per 100,000 women. This risk is slight when compared with the risks of many other major surgical procedures, but it is very much greater than the risks of using temporary contraceptive methods such as oral contraceptives or the IUD (see **Population Reports,** Series A, No. 5, *OCs — Update on Usage, Safety, and Side Effects*, January 1979, and Series B, No. 3, *IUD — Update on Safety, Effectiveness, and Research*, May 1979). It is also considerably greater than the risk of sterilization itself (240). The risk of sterilization reversal cannot be measured directly because there have been no deaths among the fewer than 1,000 cases of sterilization reversal that have been reported (237). Instead, the rough estimate of less than 100 per 100,000 is made using data from other sources. Since all these data come from developed countries, the risk in developing countries can be assumed to be higher.

The risk of deep vein thrombosis, which can be fatal if it results in pulmonary embolism, is inherent in any major surgical procedure. It is a particularly common cause of death in lengthy abdominal and gynecological surgery (54, 199). Since stasis of blood supply can initiate thrombosis (26, 199), elevating the uterus for several hours during the reversal procedure may contribute to the risk of pulmonary embolism. Mortality from pulmonary embolism after major surgery ranges from 200 to 700 per 100,000 procedures (147, 161), but most of these patients are over age 40 and, of course, in poor health. For a comparison to candidates for sterilization reversals — usually younger, healthy women — kidney donors may be appropriate. In a series of 3,240 US kidney donors, one died following pulmonary embolism, for a mortality rate of about 30 per 100,000 (24).

The risk of anesthesia varies with the surgical procedure involved, the preoperative condition of the patient, and other factors, and anesthetic death is not well understood or easy to diagnose clearly (100, 162). Thus it is difficult to estimate the mortality due to anesthesia that could be expected among women undergoing anastomosis. In the series of kidney donors, one death may have been due to anesthetic accident, for a mortality rate of about 30 per 100,000 (24).

Recent Books on Microsurgery for Sterilization Reversal and Treatment of Infertility

Reversal of Sterilization (Proceedings of a Workshop on Reversal of Sterilization, San Francisco, California), edited by John J. Sciarra, Gerald I. Zatuchni, and J. Joseph Speidel; published by Harper and Row, 2350 Virginia Avenue, Hagerstown, Maryland 21740, USA. (Program for Applied Research on Fertility Regulation Series) 1978. 302 p. $15.00.

Reversibility of Female Sterilization, edited by I. Brosens and R.M.L. Winston; published by Academic Press Inc. (London) Ltd., 24/28 Oval Road, London NW1 7DX, UK, and Grune and Stratton, 111 Fifth Avenue, New York, New York 10003, USA. 1978. 194 p. $19.50.

Microsurgery in Female Infertility (Proceedings of the Serono Clinical Colloquia on Reproduction, No. 1), edited by P.G. Crosignani and B.L. Rubin; published by Academic Press Inc. (London) Ltd., 24/28 Oval Road, London NW1 7DX, UK, and Gruen and Stratton, 111 Fifth Avenue, New York, New York 10003, USA. 1980. 134 p. $21.00.

Microsurgery, edited by Sherman J. Silber; published by Williams and Wilkins, 428 East Preston Street, Baltimore, Maryland 21202, USA. 1979. 492 p. $59.95.

Microsurgery in Gynecology (Proceedings of the Workshop for Laparoscopy and Microsurgical Repair of the Fallopian Tube and the First International Congress of Gynecologic Microsurgery), edited by Jordan M. Phillips; published by the American Association of Gynecologic Laparoscopists, 11239 South Lakewood Boulevard, Downey, California 90241, USA. 1977. 264 p. $35.00.

Endoscopy in Gynecology (Proceedings of the Third International Congress on Gynecologic Endoscopy), edited by Jordan M. Phillips; published by the American Association of Gynecologic Laparoscopists, 11239 South Lakewood Boulevard, Downey, California 90241, USA. 1978. 560 p. $45.00.

Microsurgery in Gynecology II, edited by Jordan M. Phillips; to be published by the American Association of Gynecologic Laparoscopists, 11239 South Lakewood Boulevard, Downey, California 90241, USA. 1980 (in press).

Copies may be purchased directly from the publishers listed. Prices are as of July 1980.

Ectopic Pregnancy

The most serious persistent risk after sterilization reversal is the long-term risk of ectopic pregnancy. Ectopic pregnancy is a life-threatening condition requiring immediate surgery. A pregnancy is about 10 times more likely to be ectopic in a woman who has had tubal anastomosis using microsurgical techniques than in a woman who has never undergone tubal surgery. While this difference is substantial, the rate associated with microsurgery—about 8 percent of reported pregnancies—appears to be a considerable improvement over ectopic pregnancy rates of about 21 percent after tubal surgery using conventional techniques. Individual surgeons using microsurgical techniques report even lower rates (14, 135, 176, 212, 256) (see Table 1, p. C-100). (Due to the method of reporting, these figures may overestimate the proportion of ectopic pregnancies.) When considered on the basis of the total number of women undergoing reversal procedures, about 3 percent of women had ectopic pregnancies after microsurgical reversal; about 7 percent, after reversal using conventional techniques (see Table 1).

By comparison, in large series reported from hospitals, 0.3 to 3 percent of all pregnancies are ectopic (84). In women with no history of tubal disease, like most who undergo reversals, rates may be in the lower end of this range. Like sterilization reversal, sterilization itself appears to increase the likelihood that a pregnancy, should it occur, will be ectopic. Rates of 7 and 16 percent ectopic pregnancies after sterilization have been reported in major studies (47, 304). While these proportions are similar to those seen after sterilization reversal, the overall chances of pregnancy, ectopic or intrauterine, are less than one percent after sterilization.

Mortality from ectopic pregnancy in the US and Great Britain has amounted to 200 to 400 deaths per 100,000 such pregnancies (25, 124, 266). In developing countries the rate may be higher, since survival depends on access to surgery. In addition, anemia and pelvic infection, which are common in some developing countries, make diagnosis difficult and so may delay treatment (179).

In any facility where sterilization reversals are performed, women should be fully informed about the danger of ectopic pregnancy and the symptoms to look for. They should be urged to seek medical care at the first sign of pelvic pain, nonmenstrual vaginal bleeding, or nausea and vomiting (35).

Spontaneous Abortion

While some tubal surgery may result in increased rates of spontaneous abortion, microsurgical techniques for sterilization reversal seem to have lowered the risk to a rate comparable to that for the general population. In nine series involving microsurgical techniques that report sufficient data, 14 percent of reported pregnancies ended in spontaneous abortion (14, 104, 127, 176, 214, 222, 255, 317, 334). This is similar to the normal rate of reported spontaneous abortions of 12 percent of all pregnancies, found in a large US study (154, 208). With conventional tubal surgery to treat infertility, spontaneous abortion rates may have been higher — 18 percent of all pregnancies in one recent study (154). To compare these data in another way, in 10 series of anastomoses employing microsurgical techniques, 9 percent of women experienced a spontaneous abortion (see Table 1), and in the large US study the percentage of first pregnancies ending in spontaneous abortion also was about 9 (208).

It is possible, of course, that results reported after microsurgery do not include all early spontaneous abortions or all ectopic pregnancies that were preceeded by a live birth. Until more comprehensive reporting systems are in effect, therefore, definitive conclusions are not possible.

POTENTIAL DEMAND FOR REVERSAL

At present, even though medical interest is great, very few sterilized women are likely to seek tubal anastomosis procedures. The number of women who will have reversals depends on:

- the number sterilized
- the number of those sterilized who regret the procedure, want to have more children, and are willing to undergo a reversal procedure
- the number of those wanting reversal who are good candidates from a medical standpoint — young, otherwise fertile, generally healthy, and with a fertile partner
- and, ultimately, the availability of surgeons and facilities for safe and effective reversal procedures.

Table 4. Estimated Number of Women of Reproductive Age Who Have Been Sterilized for Contraceptive Purposes

	No. of Women (in Thousands)
Africa	250
Asia	46,000
Europe	5,000
Latin America	4,000
Middle East	150
North America	6,000
Oceania	250
Total	**61,650**

Note: Based on national contraceptive prevalence rates from Contraceptive Prevalence Surveys, World Fertility Surveys, and Knowledge, Attitude and Practice surveys, as reported in Visaria, Population Reference Bureau (320), and US Bureau of the Census Country Demographic Profiles. Also, Chen (44), Nortman and Hofstatter (211), USAID (313).

The more women sterilized, the more who may seek reversal. The number of women of reproductive age who are sterilized has been increasing in the past decade and is expected to increase further in coming years (111, 163, 178). According to the Association for Voluntary Sterilization (AVS), by 1980 over 90 million couples worldwide had chosen surgical sterilization — either male or female — as their method of contraception (20). Based on the latest program data and recent contraceptive prevalence surveys, an estimated 60-65 million couples rely on female sterilization as a means of fertility control — about 46 million in Asia, 6 million in North America, 5 million in Europe, 4 million in Latin America, and about 500,000 to one million in Africa, the Middle East, and Oceania (see Table 4).

Estimating how many of these women would be candidates for reversal, if adequate services were available, is difficult (298). Survey questions about attitudes after sterilization vary greatly, and often expressions of regret do not mean a woman wants more children or is willing to undergo a second operation. Rates of regret in various developed and developing countries range from one-tenth of one percent to 10 percent, but, on the average, only about one percent of sterilized women have expressed regret for reasons that might be remedied by a reversal procedure (see Table 5).

Reasons for Regret

The most commonly cited group of reasons for regretting sterilization are not appropriately remedied by reversal. Of regrets that could be remedied by reversal, surveys in developing countries report that a desire for more children, usually without further explanation, is the most common reason for regretting sterilization, while in the developed countries the desire to have children with a new husband is most common. Among women who actually seek reversals and are interviewed by surgeons, these two reasons are most prominent,

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although in developing countries the death of children is also a common reason for seeking reversal.

In both developed and developing countries many women who regret sterilization do so because they have experienced problems of general health such as feelings of physical weakness, gynecological changes such as altered menstrual patterns, marital or sexual problems, or mood changes, and, correctly or incorrectly, they attribute these experiences to sterilization (see Table 6). Physical problems that cause women to regret sterilization should be diagnosed and directly treated. Emotional and marital problems are best treated with counseling. In addition to these women, some women regret being sterilized because the sterilization failed and they experienced an intrauterine or ectopic pregnancy. In none of these cases, which together constitute the largest group expressing regret in surveys, would reversal be an appropriate remedy.

Reversals would alleviate regret in cases where restored fertility is clearly desired. Divorce and remarriage, leading to the desire to have a child with the new husband, is the most common of these reasons in developed countries, while in developing countries, where women are less likely to remarry, this reason is seldom cited (12, 19, 45, 177, 302). In developing countries where infant mortality rates are high, the death of a child, especially a male child, is often the reason for regretting sterilization (see Table 6). One Bangladesh study reported that most of the women who regretted sterilization did so because they had lost a child after the procedure (302). Since infant and childhood mortality in Bangladesh is high — 5 percent of women sterilized in 1977 lost a child in the year after the procedure (12) — it is clear why this should be a common reason for regretting sterilization.

Other reasons for regretting sterilization include lack of awareness that sterilization was permanent. In some cases, for example, women took the expression "tieing the tubes" literally and assumed that the tubes could later be as easily untied (104). Other women may have been unaware of or unable to find alternative, temporary methods of contraception (220).

The reasons that women regret sterilization strongly enough to seek reversal are difficult to assess on the basis of surgeons' records, since in most situations other physicians have seen the women first and dissuaded those for whom reversal would be inappropriate. Nonetheless, the most common reason for re-

Table 5. Proportion of Women Regretting Sterilization, Selected Surveys, 1958-1980

Country or Area	Ref. No.	Date of Sterilizations	Follow-up Interval	Number of Responses (% of Sample)	% Expressing Regret or Dissatisfaction	% Expressing Regret Potentially Remediable by Reversal[a]
DEVELOPING AREAS						
Bangladesh	12	1977	13-18 months	417 (83)	10.1	1
	243	1977	2 weeks	131 (96)	3.8	NA
	302	NA	1-4 years	521 (NA)	2.1	NA
Hong Kong	177	1957 1962	3-8 years	1,055 (18)	1.3	0.1
India	69	1965-1966	11 months-3 years	124 (49)	4.0	NA
	159	NA	NA	2,099 (NA)	2.1	NA
	160	1974-1975	3-10 months	116 (73)	0.9	NA
	217	NA	Maximum 14 years	7,460 (NA)	1.1[b]	1.1
Puerto Rico	220	1956-1961	1-6 years	519 (67)	5.3	3.3
Singapore	45	1973	1½-2½ years	126 (84)	6.3	2.4
Thailand	19	1975	1 year	300 (NA)	1.7	NA
DEVELOPED AREAS						
Australia	324	NA	Average 2 years, maximum 5 years	425 (75)	3.0	NA
Belgium	37	1972-1979	0.6-6 years	322 (79)	10.1	2.5
Japan	167	NA	NA	370 (59)	10.0	NA
Sweden	86	1951	5-6 years	255 (91)	6.7	NA
United Kingdom	10	NA	2-3½ years	614 (57)	8.8[b]	2.9
	27	1961-1966	1-5 years	168 (35)	3.6	NA
	59	NA	20-46 months	220 (NA)	5.9	NA
	91	NA	2-7 years	185 (NA)	10.3	NA
	92	1963-1965	NA	98 (79)	3.0	NA
	294	NA	1-3 years	151 (82)	3.3	2.0
	306	1948-1960	2-9 years	186 (NA)	4.3	3.2
	326	1965-1974	Minimum 2 years	485 (89)	4.9	2.3
United States	22	1952-1955	½-4 years	311 (68)	9.6	NA
	38	1971	2 years	80 (85)	3.8	3.8
	77	NA	½-3½ years	100 (NA)	0	0
	260	1972-1973	1½-3 years	93 (NA)	5.4	NA
	261	NA	12-28 months	147 (73)	2.7	NA
	300	1974-1976	1-3 years	231 (86)	2.6[b]	0.4

NA = not available

[a] See Table 6. Includes women regretting sterilization because of death of child, change of marital partner, unaware procedure was permanent, or desire more children.
[b] Expressing regret and desiring reversal

questing reversal reported by surgeons performing reversals in developed countries is the desire for a child with a new partner. This reason accounted for about 75 percent of reversal requests in a Canadian study (105). From developing countries, reports are available on a small number of women on whom reversals were performed. Of 12 cases reported in India, six women had lost sons and six, although they had not lost sons since the procedure, wanted to have another son (159, 217). In an unreported number of reversal cases in Thailand, 85 percent had been divorced and remarried, with the first husband taking custody of his children, and 15 percent had lost a child or wanted more children for other reasons (18). Of three cases in Brazil, one woman had lost a child, one had remarried, and one had been sterilized postpartum without her knowledge (206).

Eligibility for Reversal

Of those women wanting a reversal procedure in order to have more children, experience from the US and other developed countries suggests that more than half may be poor risks because of either age, poor health, or causes of infertility other than sterilization. Women in their late 30s experience declining fecundity, which may make pregnancy unlikely even if tubal patency is restored. Since the average age at sterilization is about 30, most sterilized women are eligible for reversal only for a limited period (12, 177, 216). About 50 percent of all sterilized women are estimated to be 38 or older or suffering some fecundity or general health impairment.

Another 40 percent or so of the remaining number may be ineligible because too much of the fallopian tube was destroyed during the sterilization. In Australia, for example, Peter Paterson and colleagues reported that 6 of 22 women (27 percent) requesting reversal had to be turned away because of almost total destruction of both tubes (224). Similarly, in Britain 25 of 40 women (62 percent) who had been sterilized by electrocoagulation were rejected because of insufficient tubal length (343). In one US study, 7 of 15 women otherwise eligible for reversal (47 percent) were rejected because previous surgery left too little of the tubes intact (39).

Finally, careful consideration of the risks of the procedure, the probability of pregnancy, the danger of ectopic pregnancy, and in some cases the cost discourages about 20 percent of women who would otherwise be eligible. In one study, 6 of 36 women (17 percent) requesting reversal at a hospital in Scotland decided against reversal after consultation (307). Similarly, 5 of 27 women (19 percent) in an Australian study (224) and 6 of 27 women (22 percent) in a US study decided against reanastomosis after discussion of cost and other factors (39).

Table 7 shows these rough estimates in terms of the number of women worldwide and in a single country, India, who might actually be candidates for reversal procedures if these procedures were available. About 100,000 women worldwide, 8,000 of them in India, probably constitute the maximum number who would undergo reversal under present conditions. Although these numbers are small — under two-tenths of one percent of those sterilized — and are little more than educated guesses, they raise policy and programmatic issues for national family planning administrators who must consider whether sterilization reversal services should be provided and, if so, where and under what conditions.

Table 6. Reasons Given for Regretting Sterilization as Percentage of Number of Women Regretting Sterilization, Selected Studies, 1968-1980

Country or Area	Ref. No.	No. Regretting Sterilization	Percentage of All Women Regretting Sterilization				
			Regret Potentially Remediable by Reversal			Reversal Not Indicated	Other & No Reason Reported[c]
			Death of Children	Marital Change	Wants More Children[a]	Unanticipated Sequelae[b]	
DEVELOPING AREA							
Bangladesh	12	42	0	0	10	69	21[c]
Hong Kong	177	14	0	7	0	93[d]	0
India	217	84	12	0	49	6	33
Puerto Rico	220	28	0	0	25	64	11[e]
Singapore	45	8	0	13	25	63	0
Thailand	19	5	40	0	0	60	0
DEVELOPED COUNTRIES							
Belgium	37	8	0	0	25	75[d]	0
United Kingdom	10	54	0	33	0	63	4
	294	5	0	0	20	40	40
	306	8	13	25	38	25	0
	326	24	4	25	17	4	50[f]
United States	38	3	0	0	0	100	0
	300	6	0	0	17	83	0

[a] Wanted more children for various reasons other than marital change or death of child, or no further reason reported.

[b] Includes complaints about general health, gynecological changes, depression, guilt, irritability, domestic problems, and sexual dissatisfaction, attributed by patient to sterilization

[c] Includes vague reports of reasons; women reporting social disapproval; sterilization recommended by psychiatrists; other; no reason reported.

[d] Includes women who had uterine and ectopic pregnancies (sterilization failures)

[e] Uninformed of alternative methods of contraception

[f] Sterilized for primary medical indications

Table 7. Estimated Need for Procedures to Reverse Female Sterilization, World and India

	World			India
	% of All Sterilized Women	% of Preceding Group	Number (in 1,000s)	Number (in 1,000s)
Sterilized[a]	100		62,000	5,308
Regretting sterilization for reasons that could be remedied by reversal[b]	1	1	620	53
No physical or fecundity problems and under age 38[c]	0.5	50	310	27
Sufficient tubal length undamaged by sterilization[d]	0.2	40	124	11
Still interested after consideration of risks, costs, chance of success[e]	0.16	80	99	8

[a] See Table 4

[b] See Tables 5 and 6

[c] See text, p. C-116, Cantor and Riggall (39), Mosher (355), Leridon (354)

[d] Cantor and Riggall (39), Paterson (224), Phillips et al. (237), Winston (393)

[e] Cantor and Riggall (39), Paterson (224)

PROGRAM ISSUES

For the 1980s the question of providing facilities and trained physicians for sterilization reversal procedures raises certain problems. On one hand, various pressures impel governments and individual surgeons to provide these services. On the other hand, the costs, training requirements, and continuing support of microsurgery could be a heavy burden for some developing countries which have not yet provided elementary health care for many of their people.

Factors which are encouraging governments and physicians to offer reversal services are:

- The increasing popularity of female sterilization: more women — and more young women of low parity — are choosing this method, thus increasing the number of women who want and qualify for reversal procedures (see p. C-114).
- The development and increasing use of more reversible techniques of female sterilization such as clips (see p. C-106).
- The improving rates of pregnancy and live birth after microsurgical anastomosis (see Table 1, pp. 100-101).
- The enthusiasm of surgeons everywhere to learn more about these new procedures and to perform them in their own facilities — an enthusiasm comparable to the early reception of laparoscopy (57, 316).
- The potential application of microsurgery to a wide range of infertility problems.
- The particular concern of some religious leaders, especially in Catholic and Muslim countries, about any fertility control measure that is irreversible, a concern which might be alleviated if reversal were a genuine possibility (149).
- The opportunity for family planning programs to provide a safety net, as it were, to assist hardship cases, to protect against political criticism, and to offer the possibility of reversal if infant death or other events cause women to regret an earlier sterilization (298).

Some of these points are obvious and well-documented, such as increases in the number of sterilized women. Others, relating to religious or political attitudes, are intangible but may greatly influence a national decision to make sterilization services widely available (149).

While the advantages of providing sterilization reversal services may seem evident, there are also disadvantages, particularly in developing countries where health budgets are usually small, surgeons few, and back-up health facilities for such life-threatening complications as ectopic pregnancy, minimal.

Costs

The cost of sterilization reversal cannot be precisely determined, but it is clearly high. What the individual woman pays for the actual procedure reflects how her nation's health care system is financed. National health care programs or extensive health insurance plans mean lower payments by the patient, but then other members of society share the remaining cost. The total cost to society includes not only the cost in medical time and hospital services required for each procedure but also the cost of training surgeons, purchasing equipment, and maintaining hospital facilities.

In the United States, the charge to a patient for tubal anastomosis is at least $4,000 (132, 283). Surgery for anastomosis typically lasts at least two hours, followed by a 5- to 6-day stay in the hospital. Operating room charges for such a procedure run from $600 to $975, and charges for a hospital room (at $180 a day), from $900 to $1,100. Physicians' fees vary considerably, but the most common fee in the United States in 1980 appears to be $1,500 (76, 132, 169, 252, 283). Presurgical screening, anesthesiologist's charges, laboratory fees, medication, and follow-up examinations add to the cost.

Even where medical fees and charges are lower, the cost of a single reversal procedure, giving one woman a chance to bear more children, is greater than the cost of immunizing a thousand children already born against childhood disease or of providing reversible forms of contraception to a thousand women who do not want more children (13, 125).

Training and Facilities

Whereas vasectomy for men and minilaparotomy for women can be performed by general practitioners or nonspecialized surgeons, reversal of sterilization, especially female sterilization, is a much more difficult procedure. Modern techniques of microsurgery require extensive training and regular practice to yield satisfactory results.

Programs to train obstetricians and gynecologists in microsurgery require didactic lectures and at least 100 hours of laboratory experience and use of magnifying equipment on animals before human surgery is attempted (239, 316). Use of magnification equipment, both microscopes and optical loupes, must be coordinated with use of fine microsurgical instruments, sutures, and delicate tissue handling techniques. Progress is often frustratingly slow. Several weeks in a well-equipped center with individual instrumentation and instruction may be necessary before a surgeon can work effectively with the new equipment (36, 239).

Moreover, once proficiency is established, surgeons are urged to perform at least one anastomosis on animals or extirpated human tubes every week. To maintain necessary skill, sensitivity, and patience, surgeons should avoid stimulants such as coffee, alcohol, emotional stress, heavy exercise, and lack of sleep before an operation (316).

As noted above (p. C-109), the equipment for microsurgery can be expensive. Also, it requires careful maintenance. For best results, facilities should be used regularly. With microsurgery, as with laparoscopy, constant practice and use of equipment is important to maintain the skills of the whole surgical team, which includes at least one scrub assistant and one nurse fully conversant with microsurgery.

Given these requirements, a number of surgeons and program administrators have recommended that microsurgery for tubal repair be restricted to major surgical centers where skilled surgeons have the volume of cases, the trained assistants, and the technology necessary for best results (61). Although this will limit access for rural women, at present a concentration of high quality services seems preferable to a wider dissemination of services achieving lower pregnancy rates (61). J. Joseph Speidel and Reimert T. Ravenholt have estimated that, if one in 10,000 or one in 1,000 sterilized women sought reversal, one or several specialized reversal centers in each country could meet the demand. If as many as one to 5 percent of sterilized women wanted reversal, perhaps 500-1,000 centers would be needed throughout the world. "Although this would be considerably more difficult, it is not a totally impossible goal for the developing countries" (298).

To assist with training costs and to provide reversal facilities in developing countries where sterilization programs have been undertaken, the US Agency for International Development (USAID) is supporting a limited number of programs in sterilization reversal. As USAID officials noted in 1977:

> It is only fitting that AID, as a principal outside supporter of voluntary sterilization programs in developing countries, also support reversal services where needed to offer help and hope to the few unhappy couples who are eagerly seeking to restore reproductive function. Whether the potential number of couples seeking reversal is the commonly mentioned figure of 1 out of every 1,000 operated on or is as high as 1 out of every 100 or as low as 1 out of every 10,000, the humanitarian need and responsibility for helping provide such a service remain important. (327)

With assistance from USAID, microsurgical centers have been established in 15 developing countries at universities with fertility regulation training (see Figure 17). The program, under the direction of John Rock, first provided training in microsurgery at The Johns Hopkins University between 1978 and 1980 for surgeons from each country. Now the newly established centers have a twofold purpose: to make microsurgery and training in microsurgery available within each country and to establish a data registry for microsurgical procedures. Surgeons trained in the same techniques will record all relevant factors for each case. This uniformity will permit composite evaluation of various microsurgical procedures (254). As of August 1980, after 6 months of operation in developing countries, about two-thirds of the procedures performed had been followed by pregnancy (252).

There is an active, if small, reversal program in India. In 1979 Datta Pai reported that 8 women had undergone reversal after a survey of 7,460 sterilized women had informed them all of the potential for reversal. Two were lost to follow-up and one of the remaining six had had a live birth (217).

In China, where sterilization is widely used and the one-child family is being promoted, Jordan Phillips reports that many sterilization reversals have been performed using conventional techniques; atraumatic microsurgical methods are now being introduced. Using conventional techniques, pregnancy rates were under 20 percent (236). Concern over sterilization reversal was spurred by the 1976 Hopei earthquake in which many children were killed.

Need for Caution

The costs and other problems involved in maintaining sterilization reversal centers indicate that caution is needed. If sterilization were the only available means of fertility control, efforts to assure reversibility would deserve highest priority. But a wide array of other methods exists, including oral contraceptives, IUDs, condoms, and spermicides, that can be easily used by most men and women who are not ready for a permanent method. The fact that a substantial proportion of female sterilizations may be reversible under optimal conditions should not be used by program administrators as an argument for promoting sterilization instead of providing a choice of methods as well.

Sterilization should always be offered as a permanent and not as a temporary form of fertility control. The requirement for informed consent by all persons accepting sterilization is important. The information and counseling provided to both men and women before any sterilization procedure should make clear that sterilization is not a suitable fertility control method unless couples are certain they want no more children. These points were emphasized by the Central Medical Committee and the Law Panel of the International Planned Parenthood Federation (IPPF) in 1977 and by the Bio-Medical Committee of the Association for Voluntary Sterilization (AVS) in 1979 (1, 150).

The AVS panel suggested that the patient should think of the procedure as irreversible but the physician should perform it as if it were reversible. In general, a sterilization candidate should be told that sterilization is a permanent method of contraception but that in selected circumstances it may be successfully reversed (5). Robert Neuwirth, director of obstetrics and gynecology at St. Luke's Hospital Center, New York, suggests that counseling before sterilization should not emphasize reversibility as a means of swaying the patient who is not entirely certain that she wishes to be sterilized. The woman who has

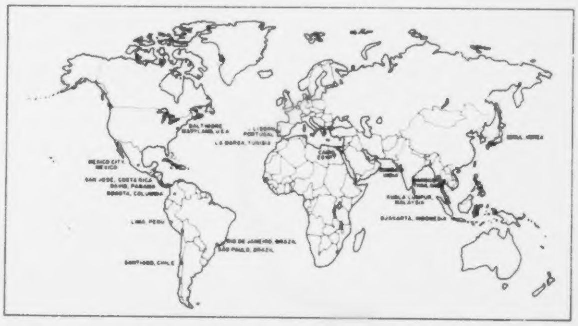

Figure 17. The US Agency for International Development is supporting a microsurgical training program to provide sterilization reversal and to evaluate microsurgical technique. Sixteen obstetrician-gynecologists from 15 developing countries have attended 2-week courses in microsurgical techniques at The Johns Hopkins University in Baltimore, Maryland, USA, and returned to establish microsurgical centers in their countries. The 16 centers are located in countries where sterilization plays a large part in family planning programs. (Courtesy of John Rock)

decided on sterilization, however, should be made aware of the potential for reversal so that, should she experience a dramatic change in circumstance such as loss of a child or divorce, she will know that reversal may be possible (209).

The number of women regretting sterilization is small and the reasons for regret sufficient to seek reversal are usually unforeseeable at the time of sterilization. Still, a few women seek reversal because they did not realize that the procedure was permanent or because they experienced physical or psychological problems for which they were not prepared (105, 132, 307, 346). Better counseling before sterilization could reduce the number of such cases. Gomel, for example, reported that 62 of 100 women requesting reversals told him they had not received adequate counseling; 6 did not realize sterilization was permanent (105). Winston reported that 3 of 103 women who requested reversal said they had not consented to the sterilization (346). Regret rates may be slightly higher among women sterilized postpartum or after abortion (19, 268).

Better counseling, medical follow-up, and improved nutrition might also reduce the number of women who regret sterilization because of psychological or physical problems that they attribute to sterilization. For example, in a follow-up study in Bangladesh, 69 percent of the women who thought they had erred in choosing sterilization a year earlier said they were dissatisfied because they felt weaker or less healthy (12). In Hong Kong, 9 of 14 dissatisfied women felt that their minor physical discomforts were due to sterilization. More seriously, two had had ectopic pregnancies after sterilization (177). For most health-related problems, better care after sterilization would be more helpful than sterilization reversal.

In short, sterilization reversal is a costly, difficult, and uncertain procedure which can help a relatively small number of women. This service should not be considered a substitute for readily available methods of reversible contraception nor an excuse for inadequate counseling or for the lack of full and informed consent before sterilization. Rather, sterilization reversal should be regarded as a last resort. These services can offer some protection against unexpected individual events or natural disasters that may occur after sterilization and can provide an additional option to individuals and national programs. Although each individual and government will have to weigh the costs, risks, and benefits of the procedure under different circumstances, the improved prognoses both for more reversible sterilization and for sterilization reversal mean that a new choice may eventually be available for the voluntary regulation of fertility.

BIBLIOGRAPHY

Asterisk (*) designates an article that was of particular value in the preparation of this issue of **Population Reports.**

1. ANONYMOUS. Expert looks at tubal sterilization. AVS Newsletter, No. 22, December 1979. p. 1, 2, 4.

2. ANONYMOUS. Female sterilisation: no more tubal coagulation. British Medical Journal 280(6220): 1037. April 12, 1980.

3. ANONYMOUS. International Fertility Research Program sponsors effort in 43 lands to develop new, safer methods. International Family Planning Perspectives 5(3): 128-129. September 1979.

4. ANONYMOUS. Non-surgical sterilization technique tested. Lankenau Hospital Reporter, Spring 1979. p. 1-2.

5. ANONYMOUS. The problem of reversal. International Project Association for Voluntary Sterilization, Inc., Newsletter, No. 21, September 1979. p. 1-2.

6. ANONYMOUS. Reversal of female sterilization. IPPF Medical Bulletin 12(6): 1-2. December 1978.

7. ADAMS, C.E. Consequences of accelerated ovum transport, including a re-evaluation of Estes' operation. Journal of Reproduction and Fertility 55(1): 239-246. January 1979.

8. ADAMS, J.E. Peritoneal adhesions: an experimental study. Lancet 1(4671): 663-668. March 8, 1913.

9. AFZELIUS, B.A., CAMNER, P., and MOSSBERG, B. On the function of cilia in the female reproductive tract. Fertility and Sterility 29(1): 72-74. January 1978.

10. ALDERMAN, B. Women who regret sterilisation. [Letter] British Medical Journal 2(6089): 766. September 17, 1977.

11. ALDRIDGE, A.H. Temporary surgical sterilization with subsequent pregnancy. American Journal of Obstetrics and Gynecology 27: 741-745. May 1934.

*12. ALI, M.N., HUBER, D.H., KHAN, A.R., and WALIULLAH, S. Sterilization campaign of 1977: a national long term follow-up survey. Dacca, Bangladesh, Bangladesh Fertility Research Programme, July 1979. (Technical Report No. 25) 49 p.

13. ALTMAN, D.L. and PIOTROW, P.T. Social marketing: does it work? Population Reports, Series J, No. 21. Baltimore, Maryland, The Johns Hopkins University, Population Information Program, January 1980. 43 p.

14. ANSARI, A.H. End-to-end tubal anastomosis using an absorbable stent. Fertility and Sterility 32(2): 197-201. August 1979.

15. ANSARI, A.H. [Georgia Baptist Medical Center] [Estimated proportion of women requesting sterilization reversal] Personal communication, July 1980.

16. ANSARI, A.H. Tubal reanastomosis using absorbable stent. International Journal of Fertility 23(4): 242-243. 1978.

17. ANSELMO, J. Cirugia reconstructora tubaria postesterilizacion quirurgica. [Reconstructive tubal surgery after surgical sterilization.] [SP] Revista Chilena de Obstetricia y Ginecologica 42(4): 256-260. 1977.

18. ARIBARG, A. [Chulalongkorn Hospital Medical School, Bangkok, Thailand] [Sterilization regret and reversal] Personal communication, July 21, 1980. 1 p.

19. ARIBARG, A. and ARIBARG, S. Emotional reaction to interval and postpartum sterilization. International Journal of Gynaecology and Obstetrics 16(1): July-August 1978.

20. ASSOCIATION FOR VOLUNTARY STERILIZATION, INC. [AVS] AVS globe-trotter. A.V.S. News, Spring 1980. p. 1, 4.

21. BAGSHAW, H.A., MASTERS, J.R.W., and PRYOR, J.P. Factors influencing the outcome of vasectomy reversal. British Journal of Urology 52(1): 57-60. February 1980.

22. BARNES, A.C. and ZUSPAN, F.P. Patient reaction to puerperal surgical sterilization. 1. General considerations. American Journal of Obstetrics and Gynecology 75(1): 65-71. January 1958.

23. BARR, S.J. Successful end-to-end tuboplasty following previous ligation: report of a case. Fertility and Sterility 20(6): 924-927. 1969.

24. BERGEN, J.J. Current risks to the kidney transplant donor. Transplantation Proceedings 5(2): 1131-1134. June 1973.

25. BERAL, V. An epidemiological study of recent trends in ectopic pregnancy. British Journal of Obstetrics and Gynaecology 82: 775-782. October 1975.

26. BISSELL, S.M. Pulmonary thromboembolism associated with gynecologic surgery. American Journal of Obstetrics and Gynecology 128(4): 418-423. June 15, 1977.

27. BLACK, W.P. and SCLARE, A.B. Sterilization by tubal ligation: a follow-up study. Journal of Obstetrics and Gynaecology of the British Commonwealth 75(2): 219-224. February 1968.

28. BLANDAU, R.J. Comparative aspects of tubal anatomy and physiology as they relate to reconstructive procedures. Journal of Reproductive Medicine 21(1): 7-15. July 1978.

29. BLANDAU, R.J. Mechanism of tubal transport: comparative aspects. In: Brosens, I. and Winston, R.M.L., eds. Reversibility of female sterilization. London, Academic Press, 1978. p. 1-15.

30. BOECKX, W.D., VASQUEZ, G., and BROSENS, I.A. Reversibility of tubal ring sterilization. Contraception 15(5): 505-512. May 1977.

*31. BRADSHAW, L.E. Vasectomy reversibility: a status report. Population Reports, Series D, No. 3. Population Information Program, May 1976. 20 p.

32. BROOKS, P.G. Economic considerations in tubal microsurgery. In: Phillips, J.M., ed. Microsurgery in gynecology. (Proceedings of the Workshop for Laparoscopy and Microsurgical Repair of the Fallopian Tube and the 1st International Congress of Gynecologic Microsurgery, University of California, Irvine, 1977) Downey, California, American Association of Gynecologic Laparoscopists, 1977. p. 206-207.

33. BROOKS, P.G. Magnification systems alternative to the operating microscope. Journal of Reproductive Medicine 24(6): 265-268. June 1980.

*34. BROSENS, I. and WINSTON, R.M.L., eds. Reversibility of female sterilization. London, Academic Press, 1978. 194 p.

35. BUCKMAN, R.F., Jr., BUCKMAN, P.D., HUFNAGEL, H.V., and GERVIN, A.S. A physiologic basis for the adhesion-free healing of deperitonealized surfaces. Journal of Surgical Research 21(2): 67-76. August 1976.

36. BUNCKE, H.J., CHATER, N., and SZABO, Z. The manual of microvascular surgery. San Francisco, California, Ralph K. Davies Medical Center Microsurgical Unit, 1975.

37. BUYTAERT, P. and VIAENE, P. Laparoscopic tubal sterilization: postoperative follow-up and late gynecological complaints. European Journal of Obstetrics, Gynecology and Reproductive Biology 10(2): 119-124. February 1980.

38. CAMPANELLA, R. and WOLFF, J.R. Emotional reaction to sterilization. Obstetrics and Gynecology 45(3): 331-334. March 1975.

*39. CANTOR, B. and RIGGALL, F.C. The choice of sterilizing procedure according to its potential reversibility with microsurgery. Fertility and Sterility 31(1): 9-12. January 1979.

40. CARL ZEISS, INC. OPMI 7-P/H operation microscope systems for tubal reconstructive surgery. [Price list] New York, Carl Zeiss, Inc., July 1, 1979. 13 p.

41. CARREL, A. The surgery of blood vessels, etc. Johns Hopkins Hospital Bulletin 18(190): 18-28. January 1907.

42. CARTWRIGHT, A. Reversal of sterilisation. [Letter] British Medical Journal 2(6087): 641-642. September 3, 1977.

43. CASTALLO, M.A. Experimental recanalization of the fallopian tubes in the Macacus rhesus monkey. Fertility and Sterility 1(5): 435-442. 1950.

44. CHEN, P.-C. [Wayne State University] [Planned birth and vital statistics, People's Republic of China] Personal communication, May 12, 1980. 2 p.

45. CHENG, M.C.E., CHEONG, J., KHEW, K.S., and RATNAM, S.S. Psychological sequelae of sterilization in women in Singapore. International Journal of Gynaecology and Obstetrics 15(1): 44-47. July-August 1977.

46. CHENG, M.C.E., CHEW, S.C., CHEONG, J., CHOO, H.T., RATNAM, S.S., BELSEY, M.A., and EDSTROM, K.E. Safety of postabortion sterilisation compared with interval sterilisation: a controlled study. Lancet 2(8144): 682-685. September 29, 1979.

47. CHI, I.-C., GARDNER, S.D., and LAUFE, L.E. The history of pregnancies that occur following female sterilization. International Journal of Gynaecology and Obstetrics 17(3): 265-267. November-December 1979.

48. CHI, I.-C., LAUFE, L.E., GARDNER, S.D., and TOLBERT, M.A. An epidemiologic study of risk factors associated with pregnancy following female sterilization. American Journal of Obstetrics and Gynecology 136(6): 768-773. March 15, 1980.

49. CHOATE, W.H., JUST-VIERA, J.O., and YEAGER, G.H. Prevention of experimental peritoneal adhesions by dextran. Archives of Surgery 33: 249-254. February 1964.

50. CHRISTIAN, S.L. and SANDERSON, E.L. A new method of anastomosing the ovarian tube or vas deferens. Journal of the American Medical Association 61: 2157. July-December 1913.

51. CLAPPER, D. [Johns Hopkins Program for International Education in Gynecology and Obstetrics] [Change in female sterilization equipment supplies] Personal communication, June 24, 1980.

52. COGNAT, M.A. and DESSAPT, B. The history of microsurgery. In: Phillips, J.M., ed. Microsurgery in gynecology. (Proceedings of the Workshop for Laparoscopy and Microsurgical Repair of the Fallopian Tube and the 1st International Congress of Gynecologic Microsurgery, University of California, Irvine, 1977) Downey, California, American Association of Gynecologic Laparoscopists, 1977. p. 5-8.

53. COOKE, S.A.R. and HAMILTON, D.G. The significance of starch powder contamination in the aetiology of peritoneal adhesions. British Journal of Surgery, 64(1-12): 410-412. January-December 1977.

54. COON, W.W. Risk factors in pulmonary embolism. Surgery, Gynecology and Obstetrics 143(3): 385-390. September 1976.

55. CORDUA, R. End-zu-end-Vereinigung der Tubenstümpfe als Refertilisierungsmethode nach Madlenerscher Sterilisation. [End-to-end anastomosis of ligated tubes as a method of reversing Madlener sterilization.] [GE] Geburtshilfe und Frauenheilkunde 12(9): 922-926. September 1952.

56. CORFMAN, P.A. Transcervical oviduct occlusion. In: Sobrero, A.J. and Lewit, S., Eds. Advances in planned parenthood. Amsterdam, Netherlands, Excerpta Medica, 1967. (International Congress Series No. 138) p. 183.

•57. CORSON, S.L. A survey of attitudes toward gynecologic microsurgery. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Reversal of sterilization. (Proceedings of a Workshop on Reversal of Sterilization, San Francisco, California) Hagerstown, Maryland, Harper and Row, 1978. (PARFR Series on Fertility Regulation) p. 177-180.

58. CORSON, S.L. A survey of opinions and attitudes toward gynecologic microsurgery. In: Phillips, J.M., ed. Endoscopy in gynecology. (Proceedings of the 3rd International Congress on Gynecologic Endoscopy, San Francisco, California, 1977) Downey, California, American Association of Gynecologic Laparoscopists, 1978. p. 420-422.

59. COX, M.L. and CROZIER, I.M. Female sterilization: long-term follow-up with particular reference to regret. Journal of Reproduction and Fertility 35(3): 624-626. December 1973.

60. CRAFT, I. Intra-uterine sterilisation. In: Brosens, I. and Winston, R.M.L., eds. Reversibility of female sterilization. London, Academic Press, 1978. p. 153-158.

61. CRAFT, I. and YUZPF, A.A. Discussion summary [microsurgery]. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Reversal of sterilization. (Proceedings of a Workshop on Reversal of Sterilization, San Francisco, California) Hagerstown, Maryland, Harper and Row, 1977. (PARFR Series on Fertility Regulation) p. 181-182.

•62. CRAMER, D.W., WALKER, A.M., and SCHIFF, I. Statistical methods in evaluating the outcome of infertility therapy. Fertility and Sterility 32(1): 80-86. July 1979.

•63. CROSIGNANI, P.G. and RUBIN, B.L. eds. Microsurgery in female infertility. (Proceedings of the Serono Clinical Colloquia on Reproduction, No. 1) London, Academic Press, 1980. 134 p.

•64. CROXATTO, H.B., ORTIZ, M.-E., DIAZ, S., HESS, R., BALMACEDA, J., and CROXATTO, H.-D. Studies on the duration of egg transport by the human oviduct. 2. Ovum location at various intervals following luteinizing hormone peak. American Journal of Obstetrics and Gynecology 132(6): 629-634. November 15, 1978.

65. CROXATTO, H.-D., ORTIZ, M.-E., and CROXATTO, H.B. Correlation between histologic dating of human corpus luteum and the luteinizing hormone peak-biopsy interval. American Journal of Obstetrics and Gynecology 136(5): 667-670. March 1, 1980.

66. CULLEN, T.S. A normal pregnancy following insertion of the outer half of a fallopian tube into the uterine cornu. Bulletin of the Johns Hopkins Hospital 33(379): 344. September 1922.

67. CUNANAN, R.G., Jr., COUREY, N.G., and LIPPES, J. Complications of laparoscopic tubal sterilization. Obstetrics and Gynecology 55(4): 501-506. April 1980.

68. DANIELL, J.F. Microsurgical technics in reconstructive surgery of the fallopian tube. Southern Medical Journal 72(5): 585-587. May 1979.

69. DAS GUPTA, S.K., JAIN, P.C., PRASAD, B.G., and VIDYABHUSHAN. Female sterilization: a study on 124 sterilized cases. Journal of Obstetrics and Gynaecology of India 20(4): 509-516. August 1970.

70. DAVID, A., BRACKETT, B.G., and GARCIA, C.-R. Effects of microsurgical removal of the rabbit uterotubal junction. Fertility and Sterility 20(2): 250-257. 1969.

•71. DIAMOND, E. A comparison of gross and microsurgical techniques for repair of cornual occlusion in infertility: a retrospective study 1968-1978. Fertility and Sterility 32(4): 370-376. October 1979.

•72. DIAMOND, E. Lysis of postoperative pelvic adhesions in infertility. Fertility and Sterility 31(3): 287-295. March 1979.

73. DIAMOND, E. Microsurgery in infertility: instrumentation and technique. In: Phillips, J.M., ed. Microsurgery in gynecology. (Proceedings of the Workshop for Laparoscopy and Microsurgical Repair of the Fallopian Tube and the 1st International Congress of Gynecologic Microsurgery, University of California, Irvine, 1977) Downey, California, American Association of Gynecologic Laparoscopists, 1977. p. 20-30.

74. DIAMOND, E. Microsurgical reconstruction of the uterine tube in sterilized patients. Fertility and Sterility 28(11): 1203-1210. November 1977.

75. DIAMOND, E. A microsurgical study of the blood supply to the uterine tube and ovary. In: Phillips, J.M., ed. Microsurgery in gynecology. (Proceedings of the Workshop for Laparoscopy and Microsurgical Repair of the Fallopian Tube and the 1st International Congress of Gynecologic Microsurgery, University of California, Irvine) Downey, California, American Association of Gynecologic Laparoscopists, 1977. p. 69-76.

76. DIAMOND, E. [St. Barnabas Medical Center] [Sterilization reversal] Personal communication, May 6, 1980.

77. DI MUSTO, J.C., OWENS, E.B., and KLOMPARENS, K.A. A follow-up study of 100 sterilized women. Journal of Reproductive Medicine 12(3): 112-116. March 1974.

78. DIZERGA, G.S. and HODGEN, G.D. Prevention of postoperative tubal adhesions: comparative study of commonly used agents. American Journal of Obstetrics and Gynecology 136(2): 173-178. January 15, 1980.

79. DONNEZ, J., CASANAS-ROUX, F., and FERIN, J. Macroscopic and microscopic studies of fallopian tube after laparoscopic sterilization. Contraception 20(5): 497-509. November 1979.

80. DROEGEMUELLER, W. [University of Arizona] [Fimbrial sleeve] Personal communication, July 21, 1980.

81. DROEGEMUELLER, W., CHVAPIL, M., and CHRISTIAN, C.D. Modern modified Aldridge procedure. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Reversal of sterilization. (Proceedings of a Workshop on Reversal of Sterilization. San Francisco, California) Hagerstown, Maryland, Harper and Row, 1978. (PARFR Series on Fertility Regulation) p. 224-225.

82. EDDY, C.A. Tuboplastic microsurgery: appropriate sites for tubal repair. In: Brosens, I. and Winston, R.M.L., eds. Reversibility of female sterilization. London, Academic Press, 1978. p. 47-53.

83. EDDY, C.A. and ARCHER, D.A. Tubal electrophysiology after microsurgical anastomosis. In: Phillips, J.M., ed. Endoscopy in gynecology. (Proceedings of the 3rd International Congress on Gynecologic Endoscopy, San Francisco, California, 1977) Downey, California, American Association of Gynecologic Laparoscopists, 1978. p. 428-431.

84. EDELMAN, D.A. Contraceptive practice and ectopic pregnancy. IPPF Medical Bulletin 14(3): 1-2. June 1980.

85. EDGERTON, W.D. Late complications of laparoscopic sterilization. 2. Journal of Reproductive Medicine 21(1): 41-44. July 1978.

86. EKBLAD, M. The prognosis after sterilization on social-psychiatric grounds: a follow-up study of 225 women. Acta Psychiatrica Scandinavica 37(Suppl. 161): 1-161. 1961.

87. EL KADY, A.A., SAMI, G., LAURENCE, K.A., and BADAWI, S. The tubal hood: a potentially reversible sterilization technique. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Reversal of sterilization. (Proceedings of a Workshop on Reversal of Sterilization, San Francisco, California) Hagerstown, Maryland, Harper and Row, 1978. (PARFR Series on Fertility Regulation) p. 232-240.

88. ELLIS, H. The aetiology of post-operative abdominal adhesions: an experimental study. British Journal of Surgery 50(219): 10-16. July 1962.

89. ELLIS, H. The cause and prevention of postoperative intraperitoneal adhesions. Surgery, Gynecology and Obstetrics 133(3): 497-511. September 1971.

90. EL MAHGOUB, S. Mahgoub's operation: a reversible method of sterilization. Fertility and Sterility 29(4): 466-467. April 1978.

91. EMENS, J.M. and OLIVE, J.E. Timing of female sterilisation. British Medical Journal 2(6145): 1126. October 21, 1978.

92. ENOCH, M.D. and JONES K. Sterilization: a review of 98 sterilized women. British Journal of Psychiatry 127: 583-587. 1975.

93. ERB, R.A. and REED, T.P., 3rd. Hysteroscopic oviductal blocking with formed-in-place silicone rubber plugs. 1. Method and apparatus. Journal of Reproductive Medicine 23(2): 65-68. August 1979.

94. ESKELAND, G. Prevention of experimental peritoneal adhesions in the rat by intraperitoneally administered corticosteroids. Acta Chirurgica Scandinavica 125(1-2): 91-106. January-February 1963.

95. ESTES, W.L. A method of implanting ovarian tissue in order to maintain ovarian function. Pennsylvania Medical Journal 13(8): 610-613. May 1910.

96. FAYEZ, J.A. and GUTKNECHT, R. Microscopic tubouterine anastomosis with and without splints. [Abstract] Fertility and Sterility 30(6, Suppl.): 735-736. December 1978.

97. FEINBERG, R. Talcum powder granuloma. Archives of Pathology 24(1): 36-42. July 1937.

98. FERGUSON, A.H. President's address [report on hysterosalpingostomy]. Medical Fortnightly 24: 527. July 25, 1903.

99. GARCIA, C.-R. Surgical reconstruction of the oviduct in the infertile patient. In: Behrman, S.J., and Kister, R.W., eds. Progress in infertility. Boston, Massachusetts, Little, Brown, 1969. p. 255-272.

100. GEBBIE, D. Anaesthesia and death. Canadian Anaesthetists' Society Journal 13(4): 390-396. July 1966.

101. GIBSON, D. [Health Care Finance Administration] [Hospitalization charges] Personal communication, May 13, 1980.

102. GLUCKSMAN, D. Serosal integrity and intestinal adhesions. Surgery 60: 1009-1011. July-December 1966.

103. GOMEL, V. Causes of failed reconstructive tubal microsurgery. Journal of Reproductive Medicine 24(6): 239-243. June 1980.

•104. GOMEL, V. Microsurgical reversal of female sterilization: a reappraisal. Fertility and Sterility 33(6): 587-597. June 1980.

•105. GOMEL, V. Profile of women requesting reversal of sterilization. Fertility and Sterility 30(1): 39-41. July 1978.

106. GOMEL, V. Tubal reanastomosis by microsurgery. Fertility and Sterility 28(1): 59-65. January 1977.

•107. GOMEL, V. and MCCOMB, P. Microsurgery in gynecology. In: Silber, S.J., ed. Microsurgery. Baltimore, Maryland, Williams and Wilkins, 1979. p. 143-183.

108. GONZALES, B. Physicians' attitudes toward sterilization reversal. In: Phillips, J.M., ed. Endoscopy in gynecology. (Proceedings of the 3rd International Congress on Gynecologic Endoscopy, San Francisco, California, 1977) Downey, California, American Association of Gynecologic Laparoscopists, 1978. p. 166-167.

109. GORDH, T. and MOSTERT, J.W., eds. Anesthetic accidents: case studies. International Anesthesiology Clinics 16(3): 1-193. Fall 1978.

110. GRANT, A. Infertility surgery of the oviduct. Fertility and Sterility 22(8): 496-503. August 1971.

•111. GREEN, C.P. Voluntary sterilization: world's leading contraceptive method. Population Reports, Series M, No. 2. Population Information Program, March 1978. 35 p.

112. GREEN-ARMYTAGE, V.B. The new medical and surgical treatment of tubal occlusion. Proceedings of the Royal Society of Medicine 53: 360-362. May 1960.

113. GREEN-ARMYTAGE, V.B. Recent advances in the surgery of infertility. Journal of Obstetrics and Gynaecology of the British Empire 66(1): 32-39. February 1959.

114. GREENHILL, J.P. Evaluation of salpingostomy and tubal implantation for the treatment of sterility. American Journal of Obstetrics and Gynecology 33(1): 39-51. January 1937.

115. GREENWOOD, J., Jr. Total removal of intramedullary tumors. Journal of Neurosurgery 11(6): 616-621. November 1954.

116. GREENWOOD, J., Jr. Two point coagulation: a follow-up report on a new technic and instrument for electrocoagulation in neurosurgery. Archives of Physical Therapy 23(9): 552-554. September 1942.

117. GREENWOOD, J., Jr. Two-point or interpolar coagulation: review after a twelve-year period with notes on addition of a sucker tip. Journal of Neurosurgery 12: 196-197. 1955.

118. HAFEZ, E.S.E. Anatomical and physiological mechanisms of ovum transport. In: Harper, M.J.K., Pauerstein, C.J., Adams, C.E., Coutinho, E.M., Croxatto, H.B., and Paton, D.M., eds. Ovum transport and fertility regulation. (Proceedings of a meeting of the World Health Organization Task Force on Methods for the Regulation of Ovum Transport, University of Texas, San Antonio, June 23-27, 1975) Copenhagen, Denmark, Scriptor, 1976. p. 361-374.

119. HALBERT, S.A., TAM, P.Y., and BLANDAU, R.J. Egg transport in the rabbit oviduct: the roles of cilia and muscle. Science 191(4231): 1052-1053. March 12, 1976.

120. HARRISON, G.G. Death attributable to anaesthesia: a 10-year survey: 1967-1976. British Journal of Anaesthesia 50(10): 1041-1046. October 1978.

121. HEFNAWI, F., FUCHS, A.-R., and LAURENCE, K.A. Control of fertility by temporary occlusion of the oviduct. American Journal of Obstetrics and Gynecology 99(3). 421-427. October 1, 1967.

122. HELLMAN, L.M. Tubal plastic operations. Journal of Obstetrics and Gynaecology of the British Empire 63(6): 852-860. December 1956.

123. HELLMAN, L.M. The use of polyethylene in human tubal plastic operations. Fertility and Sterility 2(6): 498-504. 1951.

124. HELVACIOGLU, A., LONG, E.M., Jr., and YANG, S.-L. Ectopic pregnancy: an eight-year review. Journal of Reproductive Medicine 22(2): 87-92. February 1979.

125. HENDERSON, R.H. The challenge of EPI. World Health, February-March 1979. p. 32-35.

126. HINSHAW, D.B., HUGHES, L.D., and STAFFORD, C.E. Effects of cortisone on the healing of disrupted abdominal wounds. American Journal of Surgery 101: 189-191. February 1961.

127. HOCHULI, E. and GEHRING, H. Tubare Sterilität und operative Behandlung. [Tubal sterility and surgical treatment.] [GE] Geburtshilfe und Frauenheilkunde 38(11): 921-931. November 1978.

128. HODARI, A.A., VIBHASIRI, S., and ISAAC, A.Y. Reconstructive surgery for midtubal obstruction. Fertility and Sterility 28(6): 620-623. June 1977.

•129. HOFFMAN, J.J. A practical classification of the risk factor in restorative surgery of the fallopian tube. Fertility and Sterility 28(9): 1006-1007. September 1977.

130. HOFFMAN, J.J. Routine for microsurgical tubal reanastomosis. International Journal of Fertility 23(4): 257-259. 1978.

131. HOFFMAN, J.J. A simple solution to five of the major problems of the microsurgical reversal of sterilization. Fertility and Sterility 30(4): 480-481. October 1978.

132. HOFFMAN, J.J. [Ft. Lauderdale, Florida] [Sterilization reversal] Personal communication, May 8, 1980.

133. HOFFMAN, J.J. The synthesis between experimental and clinical microsurgery. In: Phillips, J.M., ed. Microsurgery in gynecology. (Proceedings of the Workshop for Laparoscopy and Microsurgical Repair of the Fallopian Tube and the 1st International Congress of Gynecologic Microsurgery, University of California, Irvine, 1977) Downey, California, American Association of Gynecologic Laparoscopists, 1977. p. 63-68.

134. HOLDEN, F.C. and SOVAK, F.W. Reconstruction of the oviducts: an improved technic with report of cases. American Journal of Obstetrics and Gynecology 24(5): 684-695. November 1932.

135. HOLTZ, G. [University of Oklahoma Health Sciences Center, Oklahoma City] [Anastomosis of fallopian tubes] Personal communication, July 7, 1980.

•136. HOLTZ, G. Prevention of postoperative adhesions. Journal of Reproductive Medicine 24(4): 141-146. April 1980.

137. HOLTZ, G., BAKER, E., and TSAI, C. Effect of thirty-two per cent dextran 70 on peritoneal adhesion formation and re-formation after lysis. Fertility and Sterility 33(6): 660-662. June 1980.

138. HORNE, H.W., Jr., CLYMAN, M., DEBROVNER, C., GRIGGS, G., KISTNER, R., KOSASA, T., STEVENSON, C.S., and TAYMOR, M. The prevention of postoperative pelvic adhesions following conservative operative treatment for human infertility: a final 3-year follow-up report. International Journal of Fertility 18: 109-115. 1973.

139. HOSSEINIAN, A.H., LUCERO, S., and ZANEVELD, L.J.D. Hysteroscopically delivered tubal plugs. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Reversal of sterilization. (Proceedings of a Workshop on Reversal of Sterilization, San Francisco, California) Hagerstown, Maryland, Harper and Row, 1978. (PARFR Series on Fertility Regulation) p. 241-248.

140. HOUSE, H.P. A closed circuit television camera for teaching microsurgery of the ear. Transactions American Academy of Ophthalmology and Otolaryngology 66: 269-270. March-April 1966.

141. HULKA, J.F. Current status of elective sterilization in the United States. Fertility and Sterility 28(5): 515-520. May 1977.

•142. HULKA, J.F. Current status of the reversibility of sterilization. Research in Reproduction 10(5): 1-2. September 1978.

143. HULKA, J.F. Current status of the spring clip technique. (In press)

144. HULKA, J.F. Tubal damage in elective sterilization. In: Phillips, J.M., ed. Microsurgery in gynecology. (Proceedings of the Workshop for Laparoscopy and Microsurgical Repair of the Fallopian Tube and the 1st International Congress of Gynecologic Microsurgery, University of California, Irvine, 1977) Downey, California, American Association of Gynecologic Laparoscopists, 1977. p. 109-112.

•145. HULKA, J.F., OMRAN, K., LIEBERMAN, B.A., and GORDON, A.G. Laparoscopic sterilization with the spring clip: instrumentation development and current clinical experience. American Journal of Obstetrics and Gynecology 135(8): 1016-1020. December 15, 1979.

146. HULKA, J.R. and ULBERG, L.C. Reversibility of clip sterilization. Fertility and Sterility 26(11): 1132-1134. November 1975.

147. HUME, M., SEVITT, S., and THOMAS, D.P. Venous thrombosis and pulmonary embolism. Cambridge, Massachusetts, Harvard University Press, 1970.

148. INTERNATIONAL FERTILITY RESEARCH PROGRAM. Fimbrial prosthesis trials continue. Network, October 1979. 1 p.

149. INTERNATIONAL PLANNED PARENTHOOD FEDERATION [IPPF]. Muslim outlook on abortion and sterilization. Pt. 4. In: IPPF. Islam and family planning. Vol. 2. (A faithful translation of the Arabic edition of the Proceedings of the International Islamic Conference, Rabat, Morocco, December 1971) Beirut, Lebanon, IPPF, Middle East and North Africa Region, 1974. p. 259-445.

•150. INTERNATIONAL PLANNED PARENTHOOD FEDERATION [IPPF]. CENTRAL MEDICAL COMMITTEE. [Statements on policy matters, trends in family planning, and new medical developments made by the Central Medical Committee-March 1977.] IPPF Medical Bulletin 11(2): 1-4. April 1977.

151. INTERNATIONAL PROJECT/ASSOCIATION FOR VOLUNTARY STERILIZATION, INC. [IP/AVS]. A selected bibliography on voluntary sterilization: medical/scientific and general. New York, IP/AVS, February 1977. 63 p.

152. JACOBSON, J.H., 2nd and SUAREZ, E.L. Microsurgery in anastomosis of small vessels. Surgical Forum 11: 243-245. October 1960.

153. JANSEN, R.P.S. Abortion incidence following fallopian tube repair. Obstetrics and Gynecology. In press.

•154. JANSEN, R.P.S. Cyclic changes in the human fallopian tube isthmus and their functional importance. American Journal of Obstetrics and Gynecology 136(3): 292-308. February 1, 1980.

155. JANSEN, R.P.S. [University of Texas, Health Science Center, San Antonio] [Use of antibiotics] Personal communication, July 21, 1980.

156. JEAN, Y., LANGLAIS, J., ROBERTS, K.D., CHAPDELAINE, A., and BLEAU, G. Fertility of a woman with nonfunctional ciliated cells in the fallopian tubes. Fertility and Sterility 31(3): 349-350. March 1979.

157. JONES, H.W., Jr. [Definition of microsurgery.] [Letter] Fertility and Sterility 30(4): 483-484. October 1978.

158. JONES, H.W., Jr. and ROCK, J.A. On the reanastomosis of fallopian tubes after surgical sterilization. Fertility and Sterility 29(6): 702-704. June 1978.

159. JOSHI, C.K. [Sardar Patel Medical College, Bikaner, India] [Sterilization regret study by P. Misra] Personal communication, July 31, 1980. 1 p.

160. JOSHI, C.K., MAHESHWARI, S., and SOANGARA, M.R. A follow-up study of tubectomy acceptors in Bikaner. Journal of the Indian Medical Association 73(1): 1-4. July 1, 1979.

161. KAKKAR, V.V., CORRIGAN, T.P., FOSSARD, D.P., SUTHERLAND, I., and THIRWELL, J. Prevention of fatal postoperative pulmonary embolism by low doses of heparin. Lancet 1(8011): 567-569. March 12, 1977.

162. KEATS, A.S. What do we know about anesthetic mortality? Journal of Anesthesiology 50(5): 387-392. May 1979.

163. KENDALL, M. The World Fertility Survey: current status and findings. Population Reports, Series M, No. 3. Baltimore, Maryland, The Johns Hopkins University, Population Information Program, July 1979. 30 p.

164. KENT, S.J.S., BURNAND, K.G., and OWEN, D. A method of removing starch powder from surgeons' gloves. Annals of the Royal College of Surgeons of England 57(4): 212-214. October 1975.

165. KHOO, S.K. and MACKAY, E.V. Reactions in rabbit fallopian tube after plastic reconstruction. 1. Gross pathology, tubal patency, and pregnancy. Fertility and Sterility 23(3): 201-206. March 1972.

166. KLINK, F., GROSSPIETZSCH, R., VON KLITZING, L., ENDELL, W., HUSSTEDT, W., and OBERHEUSER, F. Animal in vivo studies and in vitro experiments with human tubes for end-to-end anastomotic operation by a CO_2-laser technique. Fertility and Sterility 30(1): 100-102. July 1978.

167. KOYA, Y. Sterilization in Japan. Eugenics Quarterly 8(1): 135-141. September 1961.

168. KRAUS, H. Foreword: neurosurgery. In: Koos, W.T., Böck, F.W., and Spetzler, R.F., eds. Clinical microneurosurgery. Stuttgart, West Germany, Georg Thieme, 1976. p. xviii-ix.

169. LACKRITZ, R. [University of Texas Health Science Center, San Antonio] [Cost of sterilization reversals] Personal communication, May 7, 1980.

170. LAUFE, L.E. Assessment of demand for reversibility in developing countries. In: Brosens, I. and Winston, R.M.L., eds. Reversibility of female sterilization. London, Academic Press, 1978. p. 175-178.

171. LAUFE, L.E. The fimbrial prosthesis. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Reversal of sterilization. (Proceedings of a Workshop on Reversal of Sterilization, San Francisco, California) Hagerstown, Maryland, 1978. (PARFR Series on Fertility Regulation) p. 220-223.

172. LAUFE, L.E. Reversible methods of fimbrial enclosure. In: Zatuchni, G.I., Labbok, M., and Sciarra, J.J., eds. Research frontiers in fertility regulation. (Proceedings of the Workshop, Mexico City, Mexico, February 11-14, 1980) Hagerstown, Maryland, Harper and Row, 1980. (PARFR Series on Fertility Regulation) In press.

173. LEETON, J. Ovariotexy: an operative technique for possible reversible sterilization. In: Hasegawa, T., Hayashi, M., Ebling, F.J.G., and Henderson, I.W., eds. Fertility and sterility. (Proceedings of the 7th World Congress, Tokyo and Kyoto, Japan, October 17-25, 1971) Amsterdam, Netherlands, Excerpta Medica, 1973. p. 947-948.

174. LETCHWORTH, A.T. and LIEBERMAN, B.A. Successful reversal of clip sterilisation. [Letter] Lancet 2(7991): 904. October 23, 1976.

175. LETCHWORTH, A.T., RUSHTON, L., and NOBLE, A.D. Late complications of female sterilisation. [Letter] Lancet 1(7965): 906. April 24, 1976.

176. LIEBERMAN, B.A. and ANDERSON, M.C. Reversal of female sterilization following tubal occlusion by a spring clip. In: Brosens, I. and Winston, R.M.L., eds. Reversibility of female sterilization. London, Academic Press, 1978. p. 123-134.

177. LU, T. and CHUN, D. A long term follow-up study of 1,055 cases of postpartum tubal ligation. Journal of Obstetrics and Gynaecology of the British Commonwealth 74(6): 875-880. December 1967.

178. LUBELL, I. and FRISCHER, R. The international status of voluntary surgical contraception and its implications for national health programs. [Presented at the 4th International Conference on Voluntary Sterilization, Seoul, Korea, May 1979.] 18 p.

179. LUCAS, C. and HASSIM, A.M. Place of culdocentesis in the diagnosis of ectopic pregnancy. British Medical Journal 1(5690): 200-202. January 24, 1970.

180. LUDWIG, H. and METZGER, H. The human female reproductive tract: a scanning electron microscopic atlas. New York, Springer-Verlag, 1976. 247 p.

181. MACKAY, E.V. and KHOO, S.K. Reactions in the rabbit fallopian tube after plastic reconstruction. 2. Histopathology. Fertility and Sterility 23(3): 207-216. March 1972.

182. MARTIN, F.H. Ovarian transplantation and reconstruction of fallopian tubes: with report of two cases, and review of literature. Chicago Medical Recorder 25: 1-12. July 1903.

183. MASTROIANNI, L., Jr. Potentials for fertility regulation at the tubal level. Contraception 13(4): 447-459. April 1976.

184. MASTROIANNI, L., Jr. Structure and function of the fallopian tube as it pertains to microsurgical reconstruction. [Abstract] Presented at the Pre-Congress Symposium on Tubal Microsurgery, 10th World Congress on Fertility and Sterility, Madrid, Spain, July 6, 1980. 3 p.

185. MASTROIANNI, L., Jr. Tubal occlusion. In: Keller, P.J., ed. Female infertility. Vol. 4. Basel, Switzerland, S. Karger, 1978. p. 114-131.

186. MASTROIANNI, L., Jr. Tubal transport mechanisms. In: Campos da Paz, A., Hasegawa, T., Notake, Y., and Hayashi, M., eds. Human reproduction. Tokyo, Japan, Igaku Shoin Ltd., 1974. p. 78-82.

187. MASTROIANNI, L., Jr. When is the operating microscope necessary? International Journal of Fertility 23(4): 255-256. 1978.

•188. MCCANN, M.F. and COLE, L.P. Laparoscopy and minilaparotomy: two major advances in female sterilization. Studies in Family Planning 11(4): 119-127. April 1980.

189. MCCAUSLAND, A. High rate of ectopic pregnancy following laparoscopic tubal coagulation failures: incidence and etiology. American Journal of Obstetrics and Gynecology 136(1): 97-101. January 1, 1980.

•190. MCCOMB, P. and GOMEL, V. The influence of fallopian tube length on fertility in the rabbit. Fertility and Sterility 31(6): 673-676. June 1979.

191. MCCORMICK, W.G. and TORRES, J. A method of Pomeroy tubal ligation reanastomosis. Obstetrics and Gynecology 47(5): 623-625. May 1976.

192. MCCORMICK, W.G., TORRES, J., and MCCANNE, L.R. Tubal reanastomosis: an update. Fertility and Sterility 31(6): 689-690. June 1979.

193. MCDANIEL, G.C., KIRKLEY, W.H., and GILBERT, J.C. Femoral nerve injury associated with the Pfannenstiel incision and abdominal retractors. American Journal of Obstetrics and Gynecology 87(3): 381-385. October 1, 1963.

194. MCKEOWN, P. Safer, non-surgical female sterilization tested. Bulletin (Philadelphia, Pennsylvania), May 20, 1979. p. 1, 3.

195. MELDRUM, D.R. Femoral nerve compression injury and tubal microsurgery. Fertility and Sterility 32(3): 345-346. September 1979.

196. MILLS, B. [Carl Zeiss, Inc., New York, N.Y.] [Operating microscopes] Personal communication, May 15, 1980.

197. MILNOR, G.C., BOWLES, H.E., and MCCORRISTON, C.C. Plastic restoration of the fallopian tubes following tubal sterilization. Proceedings of the Staff Meetings of the Clinic, Honolulu 16(3): 29-31. March 1950.

198. MILOCHEVITCH, M.B. Rétablissement de la perméabilité tubaire après stérilisation d'après Madlener. [Reestablishment of tubal permeability after Madlener sterilization.] [FR] Bulletin de la Fédération des Sociétés de Gynécologie et d'Obstétrique de Langue Française 20(5): 352-355. 1968.

199. MORRIS, G.K. and MITCHELL, J.R.A. The etiology of acute pulmonary embolism and the identification of high risk groups. British Journal of Hospital Medicine 18(1): 6-10. July 1977.

200. MROUEH, A., GLASS, R.H., and BUXTON, C.L. Tubal plastic surgery. Fertility and Sterility 18: 80-84. 1967.

201. MUSICH, J.R., PAGANO, J.S., BEHRMAN, S.J., and PETERSON, E.P. Uterotubal implantation and successful pregnancy following laparoscopic tubal cauterization. Obstetrics and Gynecology 50(4): 507-509. October 1977.

202. MUTCH, M.G., Jr. Sterility and tuboplasties: critical analysis of 42 cases. Fertility and Sterility 10(3): 240-247. May-June 1959.

203. MYLLARNIEMI, H. Foreign material in adhesion formation after abdominal surgery: a clinical and experimental study. Acta Chirurgica Scandinavica (Suppl. 377): 6-48. 1967.

•204. MYLLARNIEMI, H., FRILANDER, M., TURUNEN, M., and SAXEN, L. The effect of glove powders and their constituents on adhesion and granuloma formation in the abdominal cavity of the rabbit. Acta Chirurgica Scandinavica 131(4): 312-318. April 1966.

205. MYLLARNIEMI, H. and KARPPINEN, V. Vascular pattern of peritoneal adhesions. British Journal of Surgery 55(8): 605-608. August 1968.

206. NAKAMURA, M. [São Paulo Family Planning Center, Brazil] [Reversal of tubal sterilization] Personal communication, July 1980. 9 p.

207. NASH, D.F.E. Glove-powder peritonitis. [Letter] British Medical Journal 1: 485. February 24, 1973.

208. NAYLOR, A.S. and WARBURTON, D. Sequential analysis of spontaneous abortion. 2. Collaborative study data show that gravidity determines a very substantial rise in risk. Fertility and Sterility 31(3): 282-286. March 1979.

209. NEUWIRTH, R.S. Restoration of fertility following sterilization. [Presented at the 4th International Conference on Voluntary Sterilization, Seoul, Korea, May 1979.] 2 p.

210. NEUWIRTH, R.S. and KHALAF, S.M. Effect of 32% dextran 70 on peritoneal adhesions formation. American Journal of Obstetrics and Gynecology 121(3): 420-422. February 1, 1975.

211. NORTMAN, D.L. and HOFSTATTER, E. Population and family planning programs. 9th ed. New York, Population Council, 1978. (A Population Council Fact Book) 92 p.

212. NOVY, M.J. Reversal of Kroener fimbriectomy sterilization. American Journal of Obstetrics and Gynecology 137(2): 198-206. May 15, 1980.

213. OH, C. [Johns Hopkins Program for International Education in Gynecology and Obstetrics] [Supply of minilaparotomy kits] Personal communication, June 26, 1980.

214. OWEN, E.R. and PICKETT-HEAPS, A.A. The microsurgical basis of fallopian tube reconstruction. Australian and New Zealand Journal of Surgery 47(3): 300-305. June 1977.

215. PAI, D. Greater Bombay experiment in family planning. Parel, Bombay, India, WHO Clinical Research Centre, Department of Preventive and Social Medicine Research, 1976. 149 p.

•216. PAI, D.N. The need for sterilization reversal in India. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Reversal of sterilization. (Proceedings of a Workshop on Reversal of Sterilization, San Francisco, California) Hagerstown, Maryland, Harper and Row, 1978. (PARFR Series on Fertility Regulation) p. 264-273.

217. PAI, D.N. A study of recanalization. Parel, Bombay, India, WHO Clinical Research Centre, Department of Preventive and Social Medicine Research, 1978. 8 p.

218. PALMER, R. Discussion on modern methods of salpingostomy. Proceedings of the Royal Society of Medicine 53: 357-359. May 1960.

219. PALMER, R. Reversibility as a consideration in laparoscopic sterilization. Journal of Reproductive Medicine 21(1): 57-58. July 1978.

220. PANIAGUA, M.E., TAYBACK, M., JANER, J.L., and VAZQUEZ, J.L. Medical and psychological sequelae of surgical sterilization of women. American Journal of Obstetrics and Gynecology 90(4): 421-430. October 15, 1964.

221. PATERSON, P. Tubal microsurgery: a review. Australian and New Zealand Journal of Obstetrics and Gynecology 18(3): 182-184. August 1978.

222. PATERSON, P. [Monash University, Department of Obstetrics and Gynaecology, Queen Victoria Medical Centre, Melbourne, Australia] [Update on tubal anastomosis experience] Personal communication, March 4, 1980.

•223. PATERSON, P. and WOOD, C. The use of microsurgery in the reanastomosis of the rabbit fallopian tube. Fertility and Sterility 25(9): 757-761. September 1974.

224. PATERSON, P., WOOD, C., and DOWNING, B. Microsurgical tubal anastomosis for sterilization reversal. Medical Journal of Australia 2(17): 560-561. October 22, 1977.

225. PATTON, D.L. and HALBERT, S.A. Electron microscopic examination of the rabbit oviductal ampulla following microsurgical end-to-end anastomosis. Fertility and Sterility 32(6): 691-696. December 1979.

226. PAUERSTEIN, C.J. From fallopius to fantasy. Fertility and Sterility 30(2): 133-140. August 1978.

227. PAUKSTIS, C.A. Restoration of conceptive ability following surgical sterilization. Journal of the Michigan State Medical Society 50(11): 1238-1243. November 1951.

228. PEARL, R. and SURFACE, F.M. Resection and end-to-end anastomosis of the oviduct in the hen without loss of function. American Journal of Physiology 22(3): 357-361. August 1908.

229. PEEL, J. Utero-tubal implantation. Proceedings of the Royal Society of Medicine 57(8): 710-714. August 1964.

230. PETERSON, E.P., MUSICH, J.R., and BEHRMAN, S.J. Uterotubal implantation and obstetric outcome after previous sterilization. American Journal of Obstetrics and Gynecology 128(6): 662-667. July 15, 1977.

231. PHILLIPS, J.M., ed. Endoscopy in gynecology. (Proceedings of the 3rd International Congress on Gynecologic Endoscopy, San Francisco, California, 1977) Downey, California, American Association of Gynecologic Laparoscopists, 1978. 560 p.

232. PHILLIPS, J.M., ed. Female sterilization: a comparison of the methods. Downey, California, American Association of Gynecologic Laparoscopists, 1980. In press.

•233. PHILLIPS, J.M. Gynecologic microsurgery: a déjà vu of laparoscopy. Journal of Reproductive Medicine 22(3): 135-143. March 1979.

234. PHILLIPS, J.M., ed. Microsurgery in gynecology. (Proceedings of the Workshop for Laparoscopy and Microsurgical Repair of the Fallopian Tube and the 1st International Congress of Gynecologic Microsurgery, University of California, Irvine, 1977) Downey, California, American Association of Gynecologic Laparoscopists, 1977. 264 p.

235. PHILLIPS, J.M., ed. Microsurgery in gynecology: 2. Downey, California, American Association of Gynecologic Laparoscopists, 1980. In press.

236. PHILLIPS, J.M. [American Association of Gynecologic Laparoscopists, Downey, California] [Sterilization reversal] Personal communication, June 1980.

237. PHILLIPS, J.M., HULKA, J., HULKA, B., KEITH, D., and KEITH, L. American Association of Gynecologic Laparoscopists' 1976 membership survey. Journal of Reproductive Medicine 21(1): 3-6. July 1978.

238. PHILLIPS, J.M., HULKA, J., HULKA, B., KEITH, D.M., and KEITH, L. American Association of Gynecologic Laparoscopists' 1977 membership survey. Journal of Reproductive Medicine 23(2): 61-64. August 1979.

239. PHILLIPS, J.M. and WINCHESTER, W.J. Teaching microsurgery in the vivarium workshop. In: Phillips, J.M., ed. Microsurgery in gynecology. (Proceedings of the Workshop for Laparoscopy and Microsurgical Repair of the Fallopian Tube and the 1st International Congress of Gynecologic Microsurgery, University of California, Irvine, 1977) Downey, California, American Association of Gynecologic Laparoscopists, 1977. p. 194-205.

240. POTTS, M., SPEIDEL, J.J., and KESSEL, E. Relative risks of various means of fertility control when used in less-developed countries. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Risks, benefits, and controversies in fertility control. (Proceedings of the Workshop, Arlington, Virginia) Hagerstown, Maryland, Harper and Row, 1978. (PARFR Series on Fertility Regulation) p. 28-51.

241. RADWANSKA, E., BERGER, G.S., and HAMMOND, J. Luteal deficiency among women with normal menstrual cycles, requesting reversal of tubal sterilization. Obstetrics and Gynecology 54(2): 189-192. August 1979.

242. RAFTERY, A.T. Regeneration of parietal and visceral peritoneum: an electron microscopical study. Journal of Anatomy 115(3): 375-392. September 1973.

•243. RAHMAN, M., HUBER, D., and CHAKRABORTY, J. A follow-up survey of sterilization acceptors in Matlab, Bangladesh. Dacca, Bangladesh, Cholera Research Laboratory. October 1978. (Working Paper No. 9) 29 p.

244. RAKSHIT, B. The physical and mental state following sterilisation. Journal of Obstetrics and Gynaecology of India 12: 427-430. 1966.

245. RAKSHIT, B. The scope of liquid plastics and other chemicals for blocking the fallopian tube. In: Richart, R.M. and Prager, D.J., eds. Human sterilization. Springfield, Illinois, Charles C Thomas, 1972. p. 213-221.

246. RANGE, G. Laparoscopists exchange medical information with Chinese gyns. Ob. Gyn. News 15(8): 1, 44. April 15, 1980.

247. REED, T.P. and ERB, R.A. Hysteroscopic oviductal blocking with formed-in-place silicone rubber plugs. 2. Clinical studies. Journal of Reproductive Medicine 23(2): 69-72. August 1979.

248. REPLOGLE, R.L., JOHNSON, R., and GROSS, R.E. Prevention of postoperative intestinal adhesions with combined promethazine and dexamethasone therapy: experimental and clinical studies. Annals of Surgery 163(4): 580-588. April 1966.

249. RICHART, R.M. Transcervical pharmacologic tubal closure. In: Zatuchni, G.I., Labbok, M., and Sciarra, J.J., eds. Research frontiers in fertility regulation. (Proceedings of the Workshop, Mexico City, Mexico, February 11-14, 1980) Hagerstown, Maryland, Harper and Row, 1980. (PARFR Series on Fertility Regulation) In press.

250. RIES, E. Nodular forms of tubal disease. Journal of Experimental Medicine 2(4): 347-389. July 1897.

251. ROCK, J., MULLIGAN, W.J., and EASTERDAY, C.L. Polyethylene in tuboplasty. Obstetrics and Gynecology 3: 21-29. 1954.

252. ROCK, J.A. [Johns Hopkins University] [Female sterilization reversals] Personal communication, May-August 1980.

253. ROCK, J.A. Training program in microsurgery for tubal reconstruction. Baltimore, Maryland, Johns Hopkins Hospital, [1979]. 29 p. (Unpublished)

•254. ROCK, J.A., BURKMAN, R.T., GENADRY, R., and KING, T.M. An international program for the assessment of tubal anastomosis using microsurgical technique. (To be published in the Journal of Microsurgery)

255. ROCK, J.A., KATAYAMA, K.P., and JONES, H.W., Jr. Tubal reanastomosis: a comparison of Hellman's technique without magnification and a microsurgical technique. (To be published)

256. ROCK, J.A., PARMLEY, T.H., KING, T.M., LAUFE, L.E., and HSU, B. Endometriosis and the development of tubo-peritoneal fistulae after tubal ligation. Research Triangle Park, North Carolina, International Fertility Research Program, 1980. (AID-DSPE-C-0054) 9 p.

257. ROCK, J.A., ROSENWAKS, Z., ADASHI, E.Y., JONES, H.W., Jr., and KING, T.M. Microsurgery for tubal reconstruction following Falope-Ring sterilization in swine. Journal of Microsurgery 1: 61-64. July-August 1979.

258. ROSENFELD, D.L. and GARCIA, C.-R. Laparoscopy prior to tubal reanastomosis. Journal of Reproductive Medicine 17(4): 247-248. October 1976.

259. ROY, A.K., RAMA RAO, V.J., and RAJ, B. Acceptance of female sterilization in rural Bengal (Singur): a critical study of medico-psycho-social and sexual changes. Tropical and Geographical Medicine 25: 205-210. 1973.

260. RUBINSTEIN, L.M., BENJAMIN, L., and KLEINKOPF, V. Menstrual patterns and women's attitudes following sterilization by Falope Rings. Fertility and Sterility 31(6): 641-646. June 1979.

261. RUBINSTEIN, L.M., LEBHERZ, T.B., and KLEINKOPF, V. Laparoscopic tubal sterilization: long-term postoperative follow-up. Contraception 13(5): 631-638. May 1976.

262. RYAN, G.B., GROBETY, J., and MAJNO, G. Postoperative peritoneal adhesions: a study of the mechanisms. American Journal of Pathology 65(1): 117-138. October 1971.

263. SAXEN, L. and MYLLARNIEMI, H. Foreign material and postoperative adhesions. New England Journal of Medicine 279(4): 200-202. July 25, 1968.

264. SCHENKER, J.G., FAYEMI, A.B., and POLISHUK, W.Z. The effect of hydrocortisone, rheomacrodex and fibrinolysin on sodium lauryl sulphate induced adhesions. [Abstract] In: Israel Medical Association. Abstracts of the 8th World Congress of the Israel Medical Association. Jerusalem, Israel Medical Association, May 1970. p. 65.

265. SCHMIDT-ELMENDORFF, H. Die Wiederherstellungsoperation nach Sterilisation. [The restoration operation after sterilization.] [GE] Geburtshilfe und Frauenheilkunde 8(3): 301-307. March 1948.

266. SCHNEIDER, J., BERGER, C.J., and CATTELL, C. Maternal mortality due to ectopic pregnancy: a review of 102 deaths. Obstetrics and Gynecology 49(5): 557-561. May 1977.

267. SCHROEDER, C. Die Excision von ovarian Tumoren mit Erhaltung des Ovarium. [Excision of ovarian tumors with preservation of the ovary.] [GE] Zentralblatt fuer Gynaekologie 45: 716-717. 1884.

268. SCHWYHART, W.R. and KUTNER, S.J. A reanalysis of female reactions to contraceptive sterilization. Journal of Nervous and Mental Disease 156(5): 354-370. 1973.

269. SCIARRA, J.J. Hysteroscopic approaches for tubal closure. In: Zatuchni, G.I., Labbok, M., and Sciarra, J.J., eds. Research frontiers in fertility regulation. (Proceedings of the Workshop, Mexico City, Mexico, February 11-14, 1980) Hagerstown, Maryland, Harper and Row, 1980. (PARFR Series on Fertility Regulation) In press.

•270. SCIARRA, J.J. Survey of tubal sterilization procedures. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Reversal of sterilization. (Proceedings of a Workshop on Reversal of Sterilization, San Francisco, California) Hagerstown, Maryland, Harper and Row, 1978. (PARFR Series on Fertility Regulation) p. 117-133.

271. SCIARA, J.J., ZATUCHNI, G.I., and SPEIDEL, J.J., eds. Reversal of sterilization. (Proceedings of a Workshop on Reversal of Sterilization, San Francisco, California) Hagerstown, Maryland, Harper and Row, 1978. (PARFR Series on Fertility Regulation) 302 p.

272. SEITZ, H.M., Jr., SCHENKER, J.G., EPSTEIN, S., and GARCIA, C.-R. Postoperative intraperitoneal adhesions: a double-blind assessment of their prevention in the monkey. Fertility and Sterility 24(12): 935-940. December 1973.

273. SEKI, K., EDDY, C.A., SMITH, N.K., and PAUERSTEIN, C.J. Comparison of two techniques of suturing in microsurgical anastomosis of the rabbit oviduct. Fertility and Sterility 28(11): 1215-1219. November 1977.

274. SHAHROK, V.M., and SZABO, Z. A microsurgical technique for reanastomosis of the human fallopian tube. In: Phillips, J.M., ed. Microsurgery in gynecology. (Proceedings of the Workshop for Laparoscopy and Microsurgical Repair of the Fallopian Tube and the 1st International Congress of Gynecologic Microsurgery, University of California, Irvine, 1977) Downey, California, American Association of Gynecologic Laparoscopists, 1977. p. 145-152.

275. SHAIN, R.N. Acceptability of reversible versus permanent tubal sterilization: an analysis of preliminary data. Fertility and Sterility 31(1): 13-17. January 1979.

276. SHIRODKAR, V.N. Further experiences in tuboplasty. Australian and New Zealand Journal of Obstetrics and Gynaecology 5(1): 1-6. February 1965.

277. SHIRODKAR, V.N. Plastic surgery of fallopian tubes. Western Journal of Surgery, Obstetrics and Gynecology 69(4): 253-254. July-August 1961.

278. SHIRODKAR, V.N. Reversible method of sterilization in the female. Maharashtra Medical Journal 11(2): 233-236. May 1964.

279. SHIRODKAR, V.N. Shirodkar technique of utero-tubal implantation. In: All-India Conference on Family Planning [Report of the proceedings of the third conference, Calcutta, January 5-9, 1957] Bombay, The Family Planning Association of India, 1957. p. 68-72.

280. SIEGLER, A.M. Microsurgery for tubal reconstruction. In: Phillips, J.M., ed. Microsurgery in gynecology. (Proceedings of the Workshop for Laparoscopy and Microsurgical Repair of the Fallopian Tube and the 1st International Congress of Gynecologic Microsurgery, University of California, Irvine, 1977) Downey, California, American Association of Gynecologic Laparoscopists, 1977. p. 82-95.

281. SIEGLER, A.M. Reversibility of tubal sterilization. In: Brosens, I. and Winston, R.M.L., eds. Reversibility of female sterilization. London, Academic Press, 1978. p. 73-78.

•282. SIEGLER, A.M. Selection of patients for tuboplasty. Journal of Reproductive Medicine 18(6): 333-335. June 1977.

283. SIEGLER, A.M. [State University of New York, Downstate Medical Center] [Sterilization reversal] Personal communication, May 1, 1980.

•284. SIEGLER, A.M. Surgical treatments for tuboperitoneal causes of infertility since 1967. Fertility and Sterility 28(10): 1019-1032. October 1977.

285. SIEGLER, A.M. Trends in laparoscopy. American Journal of Obstetrics and Gynecology, 109(5): 794-809. March 1, 1971.

286. SIEGLER, A.M. and HELLMAN, L.M. Tubal plastic surgery: report of a survey. Fertility and Sterility 7(2): 170-177. March-April 1956.

287. SIEGLER, A.M. and KONTOPOULOS, V. Reversal of tubal sterilization: implications, techniques, and results. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Reversal of sterilization. (Proceedings of a Workshop on Reversal of Sterilization, San Francisco, California) Hagerstown, Maryland, Harper and Row, 1978. (PARFR Series on Fertility Regulation) p. 134-142.

288. SIEGLER, A.M. and PEREZ, R.J. Reconstruction of fallopian tubes in previously sterilized patients. Fertility and Sterility 26(5): 383-392. May 1975.

289. SILBER, S.J. Microscopic vasectomy reversal. Fertility and Sterility 28(11): 1191-1202. November 1977.

290. SILBER, S.J., ed. Microsurgery. Baltimore, Maryland, Williams and Wilkins, 1979. 492 p.

291. SILBER, S.J. Vasectomy and vasectomy reversal. Fertility and Sterility 29(2): 125-140. February 1978.

•292. SILBER, S.J. and COHEN, R.S. Microsurgical reversal of female sterilization: the role of tubal length. Fertility and Sterility 33(6): 598-601. June 1980.

293. SILBER, S.J. and COHEN, R.S. Microsurgical reversal of female sterilization: techniques and comparison to vasectomy reversal. In: Silber, S.J., ed. Microsurgery. Baltimore, Maryland, Williams and Wilkins, 1979. p. 185-242.

294. SIM, M., EMENS, J.M., and JORDAN, J.A. Psychiatric aspects of female sterilization. British Medical Journal 3: 220-222. July 28, 1973.

295. SMITH, D.C. Irrigation solutions for gynecologic microsurgery. Presented at the 3rd International Workshop on Laparoscopy and Microsurgery in Gynecology, Anaheim and Irvine, California, October 12-15, 1978.

296. SMITH, J.W. Microsurgery: reviews of the literature and discussion of microtechniques. Plastic and Reconstructive Surgery 37(3): 227-245. March 1966.

297. SOONAWALLA, F.P. Reversal of male sterilization. IPPF Medical Bulletin 12(6): 3-4. December 1978.

•298. SPEIDEL, J.J. and RAVENHOLT, R.T. The potential of reversible sterilization in family planning programs. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Reversal of sterilization. (Proceedings of a Workshop on Reversal of Sterilization, San Francisco, California) Hagerstown, Maryland, Harper and Row, 1978. (PARFR Series on Fertility Regulation) p. 260-263.

299. STEPTOE, P.C. Restoration of fertility following sterilization: preoperative evaluation of the female. [Presented at the 4th International Conference on Voluntary Sterilization, Seoul, Korea, May 1979.] 5 p.

300. STOCK, R.J. Evaluation of sequelae of tubal ligation. Fertility and Sterility 29(2): 169-174. February 1978.

301. SWEENEY, W.J. The interstitial portion of the uterine tube: its gross anatomy, course and length. Obstetrics and Gynecology 19: 3-8. 1962.

302. SWENSON, I., JAHAN, F.A., and KHAN, A.R. A follow-up of tubectomy clients in Bangladesh. International Journal of Gynaecology and Obstetrics 17(1): 47-50. July-August 1979.

303. SWOLIN, K. Fifty fertility operations. 1. Literature and methods. Obstetrical and Gynecological Survey 23: 382-384. July-December 1968.

304. TATUM, H.J. and SCHMIDT, F.H. Contraceptive and sterilization practices and extrauterine pregnancy: a realistic perspective. Fertility and Sterility 28(4): 407-421. April 1977.

305. THATCHER, R.A. Reversal of sterilization of the female. [Letter] Medical Journal of Australia 1(2): 102. January 28, 1978.

306. THOMPSON, B. and BAIRD, D. Follow-up of 186 sterilised women. Lancet 1: 1023-1027. May 11, 1968.

307. THOMSON, P. and TEMPLETON, A. Characteristics of patients requesting reversal of sterilization. British Journal of Obstetrics and Gynaecology 85(3): 161-164. March 1978.

308. TRAENCKNER, K. Das Refertilisierungsproblem nach Unfruchtbarmachung aus eugenischen Gründen und die Ergebnisse der Refertilisierungsoperationen in Hamburg. [The problem of restoring fertility after sterilization for eugenic reasons and results of fertility restoration operations in Hamburg.] [GE] Archiv fuer Gynaekologie 182: 387-403. 1953.

309. TURCK, R.C. Hysterosalpingostomy. New York Medical Journal 79(24): 1193-1196. June 12, 1909.

310. UCHIDA, J. Uchida tubal sterilization (on the basis of 24,000 operations). [Presented at the 4th International Conference on Voluntary Sterilization, Seoul, Korea, May 1979.] 76 p.

311. UMEZAKI, C., KATAYAMA, K.P., and JONES, H.W., Jr. Pregnancy rates after reconstructive surgery on the fallopian tubes. Obstetrics and Gynecology 43(3): 418-424. March 1974.

312. UNITED NATIONS [UN]. DEPARTMENT OF INTERNATIONAL ECONOMIC AND SOCIAL AFFAIRS. STATISTICAL OFFICE. Statistical yearbook 1977. 29th ed. [EN, FR] New York, UN, 1978. (ST/ESA/STAT/SER.S5) 958 p.

313. UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT [USAID]. Family planning statistics. India. Washington, D.C., USAID, 1977. 3 p. (Mimeo)

314. UNITED STATES. CENTER FOR DISEASE CONTROL [CDC]. FAMILY PLANNING EVALUATION DIVISION. Surgical sterilization surveillance: tubal sterilization 1970-1975. Atlanta, Georgia, CDC, July 1979. (CDC 79-8378) 22 p.

315. UTIAN, W.H., GOLDFARB, J.M., and STARKS, G.C. Role of dextran 70 in microtubal surgery. Fertility and Sterility 31(1): 79-82. January 1979.

•316. VALLE, R.F. Training for microsurgery. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Reversal of sterilization. (Proceedings of a Workshop on Reversal of Sterilization, San Francisco, California) Hagerstown, Maryland, Harper and Row, 1978. (PARFR Series on Fertility Regulation) p. 151-161.

317. VAMMEN, A.N., GIDEON, W.P., and ELKINS, J.P. Reanastomosis of the previously ligated fallopian tube. Fertility and Sterility 32(6): 652-656. December 1979.

318. VARTAN, K. [Tubal sterilisation and its reversal.] [Letter] British Medical Journal 1(5852): 552. March 3, 1973.

319. VERMA, L.B., AWASTHI, H.N., and SRIVASTAVA, R.N. A follow-up study of sterilised cases in an urban community. Medicine and Surgery, July-August 1977. p. 19-22.

320. VISARIA, L. Family planning and marriage: 1970-1980. [Data sheet] Washington, D.C., Population Reference Bureau, 1980. 1 p.

321. VON GRAFF, E. Operative treatment of female sterility (tubal implantation). Journal of the Iowa State Medical Society 26(1): 31-33. January 1936.

322. VON IKLE, F.A. Schwangerschaft nach Implantation des Ovars in den Uterus. [Pregnancy after implantation of the ovary into the uterus.] [GE] Gynaekologia 151(2): 95-99. February 1961.

323. WALZ, W. Sterilitätsoperationen an der Tube mit Hilfe eines Operationsmikroskopes. [Tubal sterilization operation with the aid of an operating microscope.] [GE] Zeitschrift fuer Geburtshilfe und Gynaekologie 153: 49-55. 1959.

324. WATKINS, R.A., CORREY, J.F., WISE, D.A., and PERKIN, G.J. Social and psychological changes after tubal sterilization: a reevaluation study on 425 women. Medical Journal of Australia 2(7): 251-254. August 1976.

325. WHEELESS, C.R., Jr. Problems with tubal reconstruction following laparoscopic sterilization using the electrocoagulation and resection technique. Fertility and Sterility 28(7): 723-727. July 1977.

326. WHITELAW, R.G. 10-year survey of 485 sterilisations. 2. Patients' views on their sterilisation. British Medical Journal 1(6155): 34-35. January 6, 1979.

327. WILEY, A.T., RAVENHOLT, R.T., BOYNTON, W.H., and SPEIDEL, J.J. Reversal of tubal ligation in AID-funded population programs. In: Phillips, J.M., ed. Microsurgery in gynecology. (Proceedings of the Workshop for Laparoscopy and Microsurgical Repair of the Fallopian Tube and the 1st International Congress of Gynecologic Microsurgery, University of California, Irvine, 1977) Downey, California, American Association of Gynecologic Laparoscopists, 1977. p. 250-251.

328. WILLIAMS, E.A. Aspects of fallopian tube surgery. In: Stallworthy, J. and Bourne, G., eds. Recent advances in obstetrics and gynaecology. London, Churchill Livingstone, 1977. (No. 12) p. 219-236.

329. WILLIAMS, E.A. Results of reversal of female sterilization. In: Brosens, I. and Winston, R.M.L., eds. Reversibility of female sterilization. London, Academic Press, 1978. p. 89-95.

330. WILLIAMS, E.A. Sterilisation of women. [Letter] Lancet 2: 361. August 15, 1970.

331. WILLIAMS, G.F.J. Fallopian tube surgery for reversal of sterilization. British Medical Journal 1(5853): 599-601. March 10, 1973.

332. WILLIAMS, G.F. Tubocornual anastomosis for reversal of sterilisation. [Letter] Lancet 1(8008): 422. February 19, 1977.

333. WILLIAMS, G.F.J. Tubo-uterine implantation with special reference to reversal of sterilisation. Lancet 1: 825-827. April 19, 1969.

334. WILSON, P.C.M. Microsurgical repair of fallopian tubes. Medical Journal of Australia 1(26): 1013. June 26, 1976.

335. WILSON, P.C.M. [North Parramatta, New South Wales, Australia] [Results of Australia sterilization reversal series] Personal communication, July 29, 1980.

•336. WINSTON, R.M.L. Evaluating instrumentation for gynecologic microsurgery. Contemporary Ob/Gyn 15(5): 153-164. May 1980.

337. WINSTON, R.M.L. The future of microsurgery in infertility. Clinics in Obstetrics and Gynaecology 5(3): 607-622. December 1978.

•338. WINSTON, R.M.L. Microsurgery in the treatment of female infertility. Presented at the Tenth World Congress of Fertility and Sterility, Madrid, Spain, July 7, 1980.

339. WINSTON, R.M.L. Microsurgical reanastomosis of the rabbit oviduct and its functional and pathological sequelae. British Journal of Obstetrics and Gynaecology 82(7): 513-522. July 1975.

340. WINSTON, R.M.L. Microsurgical restoration of fertility following tubal ligation. [Presented at the 4th International Conference on Voluntary Sterilization, Seoul, Korea, May 1979.] 12 p.

341. WINSTON, R.M.L. Microsurgical tubocornual anastomosis for reversal of sterilisation. Lancet 1(8006): 284-285. February 5, 1977.

342. WINSTON, R.M.L. [Reconstructive tubal surgery.] [Letter] Fertility and Sterility 28(11): 1264-1265. November 1977.

343. WINSTON, R.M.L. Reversal of female sterilization. IPPF Medical Bulletin 12(6): 1-2. December 1978.

344. WINSTON, R.M.L. Tubal anastomosis for reversal of sterilization in 45 women. In: Brosens, I. and Winston, R.M.L., eds. Reversibility of female sterilization. London, Academic Press, 1978. p. 55-67.

345. WINSTON, R.M.L. Tubocornual anastomosis for reversal of sterilisation. [Letter] Lancet 1(8011): 606. March 12, 1977.

346. WINSTON, R.M.L. Why 103 women asked for reversal of sterilisation. British Medical Journal 2(6082): 305-307. July 30, 1977.

•347. WINSTON, R.M.L. and MARGARA, R.A. Techniques for the improvement of microsurgical tubal anastomosis. In: Crosignani, P.G. and Rubin, B.L., eds. Microsurgery in female infertility. (Proceedings of the Serono Clinical Colloquia on Reproduction, No. 1) London, Academic Press. 1980. p. 25-34.

348. WINSTON, R.M.L. and MCCLURE BROWNE, J.C. Pregnancy following autograft transplantation of fallopian tube and ovary in the rabbit. Lancet 2(7879): 494-495. August 31, 1974.

349. WOOD, C. and LEETON, J. Stérilisation par ovariotexie: une technique réversible. [Sterilization by ovariotexis: a reversible method.] [FR] Gynecologic Investigation 21: 299-305. 1970.

350. WOODRUFF, J.D. and PAUERSTEIN, C.J. The fallopian tube: structure, function, pathology and management. Baltimore, Maryland, Williams and Wilkins, 1969. 361 p.

351. YAFFE, H., REINHARTZ, T., LAUFER, N., and BEYTH, Y. Potentially deleterious effect of cornstarch glove powder in tubal reconstructive surgery. Fertility and Sterility 29(6): 699-701. June 1978.

352. YOON, I.B., WHEELESS, C.R., Jr., and KING, T.M. Preliminary report on a new laparoscopic sterilization approach: the silicone rubber band technique. American Journal of Obstetrics and Gynecology 120(1): 132-136. September 1, 1974.

353. ZATUCHNI, G.I. The role of reversibility in the acceptance of sterilization. [Prepared for panel presentation at the 4th International Conference on Voluntary Sterilization, Seoul, Korea, May 1979.] 7 p.

ADDENDA

354. LERIDON, H. Permanent sterility. In: Leridon, H. Human fertility: the basic components. Chicago, Illinois, University of Chicago Press, 1977. p. 96-103.

355. MOSHER, W. Reproductive impairments among currently married couples: United States, 1976. Advancedata, No. 55, January 24, 1980. p. 1-11.

356. PATERSON, P. Microsurgery of the oviduct. In: Sciarra, J.J., Zatuchni, G.I., and Speidel, J.J., eds. Reversal of sterilization. (Proceedings of a Workshop on Reversal of Sterilization, San Francisco) Hagerstown, Maryland, Harper and Row, 1978. (PARFR Series on Fertility Regulation) p. 162-169.

357. REED, T.P. and ERB, R.A. Tubal occlusion with silicone rubber. Journal of Reproductive Medicine 25(1): 25-28. July 1980.

Erratum

In **Population Reports** J-22, "Traditional Midwives and Family Planning" (May 1980), two bibliographic entries were mistitled. Corrected, the references read:

555. WEST, K. Draft of traditional birth attendant case study for Sierra Leone. April 2, 1979. 65 p. (To be published by World Health Organization)

556. WEST, K. Draft of traditional birth attendant case study for Sri Lanka. 62 p. (To be published by World Health Organization)

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